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PRACTICAL
REFLECTIONS
ON THE
USES AND ABUSES
OF
BATH WATERS.



REFLECTIONS
ON THE
USES AND ABUSES
OF
BATH WATERS

EXPERIMENTS AND OBSERVATIONS
MADE FROM 1783 TO 1793

By WILLIAM RAY, M.D.

Medicus Primarius in Hospitali, et in Collegio
Medico in Universitate Cantuariensi
SALVABURGIA

L O N D O N

Printed for A. MILLAR, in the Strand.

MDCCLVII

PRACTICAL
REFLECTIONS
ON THE
USES AND ABUSES
OF
BATH WATERS.

Made from ACTUAL
EXPERIMENTS and OBSERVATIONS.

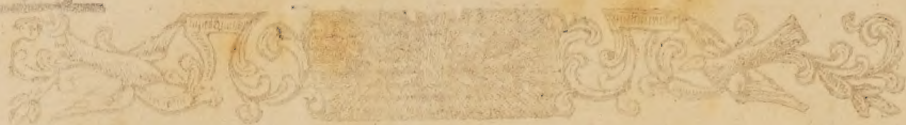
By WILLIAM BAYLIES, M. D.

*Medicus bonus et prudens, oculos mentis diligenter opponere debet,
antequam infermis de transitu ad fontes et balnea consulat.*

SAVANAROLA.

L O N D O N,
Printed for A. MILLAR, in the Strand.

MDCCLVII.



TO THE

RIGHT HONORABLE

GEORGE

LORD BY T. T. T. T. T.

Baron of R. R. R. R. R.



My Lord,

I have the honor to

THE REGENT I have in
the Duke of my Pro-

session, induces me to

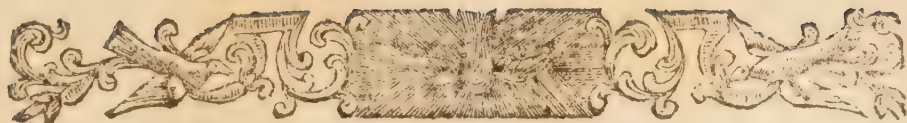
publish these sheets; and I

know no one, under the sanc-

tion of whose Name I can in-

roduce

A 3



TO THE
RIGHT HONOURABLE
GEORGE
Lord LYTTTELTON,
Baron of FRANKLY.

MY LORD,

THE Regard I have to
the Duties of my Pro-
fession, induces me to
publish these Sheets ; and I
know no one, under the Sanc-
tion of whose Name I can in-
A 3 introduce

troduce them to the Public,
more dear and respectable in
the Eyes of that Public, than
your Lordship's.

Yet was I not convinced,
from the many Instances of
your Lordship's Humanity,
that your Candour is as ex-
tensive as your Knowledge, I
would not presume to submit
them to your Censure; con-
scious that the best Writer has
room for Fears, when he sub-
jects his Writings to the In-
spection of so good a Judge.

I do not presume to hope, my Lord, that you will favour this little Tract with your Approbation ; unless, upon due Consideration, you think the Matter, or at least the Intention of the Writer, deserves it ; for I well know that no personal Friendship, or any other Motive, can ever induce your Lordship to swerve from the strictest Rules of Honour and Judgment.

But as the Plan of this Essay is calculated for promoting the bodily Health of the People, and your Lordship has ever been zealous and vigilant in the Care of their political and eternal Welfare, I flatter myself you will think it an Object worthy of a Patriot's Care, and, as such, will honour it with your Countenance and Protection.

Acceptt then, my good Lord, this little Performance,
as

as a grateful Acknowledgment
 of the many Favours you
 have conferred upon me, and
 as a publick Testimony of
 the great Gratitude, and pro-
 found Respect, with which I
 have the Honour to subscribe
 myself,

My LORD,

YOUR LORDSHIP'S

Most Humble and

Most Obedient Servant,

WILLIAM BAYLIES.

Bath, April
 1757.

to other parts of the country, and
the effect of the war on the
to which it is now applied
of the first class, and is applied to
up against the law and the
pendant from the standard, and the
ried away with the Torment and
-121-

THE
P R E F A C E.

SO strong is the Prevalence of Custom, not only at *Bath*, but in other Parts of the World, that all the Efforts of Reason are too weak to withstand it's Force: Many, even of the first Class, are not able to bear up against it; but the low and dependant Part of Mankind are carried away with the Torrent, and
com-

compelled to submit to it's tyrannic Sway.

New Plans and new Systems are formidable Things: They excite a Clamour, and put the whole Fraternity of Crafts into Uproar and Confusion. The following Advice is looked upon as sage and wholsome, 'Whatever you do, be Orthodox; keep the beaten Track; there will you enjoy the profoundest Peace and Tranquillity, undisturbed by Envy, and unmolested by the self-sufficient Tribe of Criticks.'

But, an honest and ingenuous Enquirer into Things, will not regard Consequences of such a Nature: He
will

will take hold of the Horns of no Altar, but that of Truth: In this Sanctuary, altho' he stands single, he will be fortified against an Army of Adversaries, and will repel the venomous Sting of every busy Insect, that flutters round him.

Truth, sooner or later, will prevail, and dart it's piercing Rays, through the thickest Clouds of Ignorance, Prejudice, and Falshood: And on whatever Side of an Argument it happens to appear, tho' it's Suppression be aimed at by the Authority of the Great, or the Subtilty of the Artful; and though it's Enemies be innumerable, it must ever
be

be supported by it's inseparable Attendants, Virtue, and Intrepidity.

Conscious, therefore, that I have Truth for my Shield, and that the following Remarks are published with no selfish or sinister Views, but with a Desire to promote the Welfare of the Publick, by leading them to Health, by the Paths of Reason and Experience; I venture to subject these Sheets to public Censure, with a ready Disposition to be better informed, by the Conviction of more demonstrative Reasonings, from Facts observable in Experiments or Practice.

Just

Just Arguments, founded on demonstrative Proofs, which arise from physical Experiments, stand in no need of Embellishments of Art to impose them on the World : I have not, therefore, studied to adorn this little Tract with any such ; but, instead of them, have used my utmost Endeavours to be intelligible to every Reader, by expressing my Sentiments in the plainest Manner ; being certain, that nothing can be more convincing than the plainest Truth. To this I therefore appeal, and by this I desire to stand or fall.

If any Persons are so void of Candour and Generosity, as to censure
with-

without Trial, and, with a supercilious Air of Wisdom, to condemn without Proof; whatever Views they may have in such disingenuous Conduct, they can neither gain Credit to themselves, nor Dishonour to me.

* It was the Endeavour (and a laudable one it was) of the Royal College of Physicians in *London*, in the last Reformation of their Dispensatory, “ to expel the Absurdities
 “ which had crept into the Art of
 “ Compounding, particularly that
 “ Redundancy in the Composition
 “ of Medicines, which had been

* See *Pemberton's Dispensatory* of the Royal College of Physicians, in the Narrative of the Proceedings of the Committee, p. 7.

“ contrived in former Ages, with no
 “ other View than to give an Air of
 “ Wisdom to that which really took
 “ it’s Rise from the Defect of true
 “ Knowledge ; and was continued
 “ only through Affectation and In-
 “ dolence.”

The Words of this learned Body,
 on this Occasion, are very expref-
 five *, *viz.* “ Without very fing-
 “ lar Care, discordant Ingredients,
 “ which would obstruct each other’s
 “ Operations, must often be com-
 “ bined together ; and the most
 “ powerful Material must have its
 “ Dose so diminished, as to render

* See the same, p. 4.

“ the whole a Medicine less effica-
 “ cious.” The Justness of this Re-
 mark they have illustrated to us, by
 the particular Instance of the Bark.

“ Had the *Peruvian* Bark,” (say
 they) “ when first recommended to
 “ *Europe* as a Febrifuge, been con-
 “ stantly administered in Company
 “ with a numerous Tribe of Ingre-
 “ dients, that had been ranked un-
 “ der the same Title ; if it’s Opera-
 “ tion had not been obstructed by
 “ an heterogeneous Mixture ; at
 “ least this, the only useful Part of
 “ the Composition, must have been
 “ taken in so small a Dose, that it’s
 “ real

“ real Efficacy could never have
 “ discovered itself.”

From hence they judiciously observe, “ that, succeeding Times certainly deserve Censure, when, instead of correcting such Superfluities, Men (continue in the Error, and) run into the Affectation of dilating, and extending to still greater Lengths, the Forms (of Medicines) already too copious.”

This Observation of the College on the preposterous Combination of Medicines with the Bark, is as applicable to the Use of such with *Bath Waters*; and confirms me in the Opinion,

nion, that if the Waters were exhibited in their own native Purity, and not, as is the Practice in Vogue, adulterated with a discordant Jumble of Medicines, their Effects would not only be more visible, but more desirable to the Patients that drink them.

It is, therefore, the Design of these Sheets to explode this Practice, and to point out a Method of using these Waters, by which their natural Effects may not be impeded, or a Knowledge of their true Virtues prevented. And while the Plan of my Proceedings is founded on the Opinions, and consonant to the Example

ample of this venerable and learned Society, I shall totally disregard the Sentiments of little Criticks, and rest secure under that Sanction, with Hopes, at least, that the succeeding, if not the present Generation, will be convinced of the Facts, and open their unprejudiced Eyes to the Lights of Reason and Truth.

Indeed, not only Reason, but Experience likewise, gives a further Sanction to this Doctrine ; for many Gentlemen of unquestionable Honour and Integrity, who have been conversant at *Bath*, have assured me, that more real Cures were formerly wrought

wrought by these salutary Streams, than are at this Time. What can be the Cause of this Difference? The Nature of the Waters is not changed, their Virtue and Efficacy are still the same; and it is well known, that such Numbers never resorted to these Springs for the Recovery of Health, as in our Days. If there be, therefore, a Diminution of Success, whence can it arise? Not from any Defect in the Waters themselves, but from a wrong Use and Application of them. A probable, if not the true Cause of this material Event, may possibly appear, if we duely consider the following Facts.

The

The antient Method of Practice at *Bath* was this ; No Person entered on a Course of the Waters, as they now do, without the previous Advice of a Physician ; nor did the Physicians who lived at a Distance from *Bath*, who never studied the Nature of the Waters, nor had Opportunity of observing their Effects, pretend, as is the Practice of these Times, to direct their Use. The Practicioners at the Baths were the only Oracles. These were but few, and their Assistance was by no means expensive. Indeed, so moderate was the Faculty at those Times, in their Expectation of Fees, that no more was re-

a 4 quired

quired at the Hands of the Sick, than a Fee at their coming into, and another at their Departure from *Bath*.

In this Case, no Advantage could arise to the Doctor from a Multiplicity of Prescriptions : Medicines were administered honestly and sparingly, the Apothecaries were but few, and these did not presume to prescribe.

But how much is the Scene of Things now changed ! What a Number of Physicians ? How exorbitant their Fees ? How infinite their Prescriptions ? *Bath* is now adorned in it's Seasons by no less than seventeen Physicians and almost twice as many

Apo-

Apothecaries, few of which, in our Days, are backward in assuming the Province of the Surgeon or Physician. Can all these be necessary? Can the Health and Welfare of the Publick require such Multitudes? Can they admit of such Confusion? How much more would it tend to the Honour of the Profession of Physick, as well as to the Interest of the Patients, that these Matters were rationally regulated? All Superfluities laid aside? For though the Waters do sometimes require Assistance from the medical Art; yet must their good Effects be frequently if not always prevented, as well by Incongruity

gruity in Prescription, as by an imprudent Redundancy of Medicines.

Therefore, as a conscientious Rectitude of Action is the noblest Reward of a virtuous Mind, I hope, my respectful Brethren of the Faculty, convinced of these Truths, will join with me in the honest Design of undeceiving the World, and of procuring to these salutary Streams their just Reputation.

THE

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PRACTI-



CHAPTER THE FIRST.

*The Introduction and Plan of the
Work.*

THE Satisfaction that must arise to every Individual from a Consciousness of a due Performance of his Duty, is a Pleasure of the highest Nature, and a Recompence for the greatest Pains: Every one therefore who acts as a Physician, and is intrusted with the Life of his Fellow-creature, ought to proceed rationally in the Administration of Medicines; for if he does not, his Success must ever be hazardous, and he can by no means deserve to be call'd a Physician.

B

That

That the Art of curing and preventing Diseases, turns principally upon the Remedies which the Physician uses as so many Instruments, is certain; every one of which, as the learned *Boerhaave* tells us, produces it's Effects mechanically, by virtue of the Solidity, Bulk, and Figure of it's Particles. Wherefore, to apply them skilfully, the Prescriber must be well acquainted with their Virtues, Powers, and Principles of Action, and know what Changes they will produce in the Body, whilst they perform their Office; otherwise he proceeds empirically, and can have no solid Hopes of Success. And therefore from a long Course of Experience, the learned *Hoffman* declares, That the greatest Secret in the Practice of Physick, is to be master of a few select and well-prepared Remedies,

dies; to understand their Powers, Virtues and Effects, in different Constitutions, and to be well assured in all Cases, what they can, and what they cannot do.

For this Reason, when I came to *Bath*, it was my first Design to collect from all the Writers, an accurate Account of the good and bad Effects of the *Bath* Waters, in different Diseases, that I might thence learn, not only to avoid an imprudent Administration of them; but also, from a Knowledge of their constituent Parts, lately demonstrated by chemical Experiments, might be able to reason with some degree of Certainty, how, and by what mechanical Means, they produce the several Changes which happen to the Persons who drink them.

Such an Historical Account, sub-join'd to the Chemical Scrutiny into the Contents of the Waters, would have laid a Foundation for establishing Aphorisms to direct their Use, which would be warranted both by Reason and Experience.

But, on beginning to execute this my intended Plan, it soon appeared to be absolutely impracticable; for, on perusing the Records given of the many Disorders that have been cured at *Bath*, it is evidently demonstrable, that the Waters have not only been injudiciously taken, where People have drank them without the Advice of a Physician to prepare their Bodies, or to direct them in the Dose, and Manner of drinking them; but it likewise appeared, that where Physicians had been consulted, such a Variety of Shop-Compositions
had

had usually been directed with the Waters, as to make it impossible from thence, with any Certainty, to conclude, whether it was the Medicines from the Shops, or the Waters, that were the Instruments of Relief to the Patients who recovered at *Bath*, or indeed whether the former had not often prevented the latter from doing good.

Until therefore we have a Collection of historical Facts, which set forth the Virtues of the Waters in a juster manner than we have at present; or until my Experience at *Bath* shall have furnished me with more Materials, to give a clearer Demonstration of their Effects on Animal Bodies from my own Observation; I must reason chiefly from the Phænomena arising in the chemical Examination of the Waters,

and from a due Consideration of the Nature and Properties with which their several constituent Parts are endowed, endeavour to discover and direct their Use.

From the accurate Experiments which the learned and judicious Dr. *Lucas* made on *Bath Waters*, it appears, that the long-received Notions of their being sulphureous, nitrous, saponaceous, and alkaline, are entirely groundless: And on the contrary, he has indisputably proved, that they are enriched with a mild, volatile, vitriolic, acid Spirit, united with a subtil, penetrating, neutral Salt, a Mixture of Sea-Salt, Iron, and Earth.

Conscious therefore of these indisputable Truths, unsway'd by the Authority of my Predecessors, at *Bath*, and convinced by ocular Demonstration of these several Facts, I
shall

shall reason only from them; as we may justly conclude, that it is from these Principles, the Waters have been enabled to perform the seeming Miracles, they have wrought in the Cure of most obstinate Distempers.

But as it is certain, that the Parts in which the chief Virtues of Medicines reside are very minute; it is not evident but that the Earth, and the oily Principles in the Waters, though they are seemingly very insignificant from the Proportions they bear to the other Ingredients, may be of much greater consequence in the whole Composition, than from Theory only, one would be apt to conclude.

But be this as it will, most certain it is, that the Efficacy of the Waters greatly depends on their several Parts or Principles being intimately blended

B 4 together,

together, and perfectly dissolved, or otherwise suspended in a Vehicle capable of conveying them into the most minute and inmost Recesses of the animal Machine. It is therefore evident, that the Energy of the Waters is liable to be enervated by their being administred with Shop-Compositions of a Quality contrary to an Acid, as the Acid is the grand Solvent of their contained Parts, and by it's Destruction they must become decomposed and chang'd in their Nature and Properties, and of consequence both the volatile and saline Parts which were dissolved therein, rendered incapable of entering into the course of Circulation, or of producing the natural Effects of the Waters on the Body, were it even possible for them to unite with the Blood.

Hence

Hence it manifestly appears, of how great Consequence it must be to every Patient, who has Recourse to these Springs for the Recovery of Health, that the Physicians he consults should be well acquainted with the several Principles dissolved in the Waters, and with the Properties and Uses of each of them, which must depend on a Knowledge of the general Principles of Chemistry *, whereby the natural Effects wrought

* It is much to be lamented, that of the vast Number of Physicians, so very few should thoroughly understand as they ought, the Powers and Effects of the Medicines they prescribe.

The Reason why this useful and necessary Acquaintance with the Virtues and Efficacy of Remedies is so much slighted, seems principally because the Antients, and many of the Moderns, were totally ignorant of the Elements of chemical Philosophy; so that they could not properly examine the Texture and Composition of the Simples; nor arrive at the Art of discovering the Principles whereof they consist: Whence they never obtained a previous Knowledge of their Virtues, before they prescribed the Medicines.

Vide Shaw's Hoffman, p. 2.

by

by one Body on another is explain'd; since by the help of these, and these only, they can be enabled to prescribe without destroying the natural Powers of the Waters.

It is much to be wished, therefore, that the before-mentioned ingenious Gentleman, who has proved himself so well acquainted with the Nature of the Springs at *Bath*, had farther illustrated his elaborate Treatise on Waters, by pointing out the best practical Methods of using them, and by what Helps from the Shops they would soonest bring about the Recovery of the Sick. This would have been altogether as consistent with his principal View of supporting Truth and expelling Error, as it was to shew us how, by improper Practice, the Waters have in many instances been lessened in their Efficacy.

But

But indeed, to compose a Work of that nature, which would be plain and serviceable to those who may be unacquainted with Chemistry, would require more time than a Person of his distinguish'd Abilities in the Profession, could spare from his other Avocations; and to those who are well versed in that Science, it may be thought unnecessary. However, certain it is, such a Work would be greatly useful to the Public, as it might be the means of preventing great Mischiefs from an imprudent Use of Medicines with the Waters; for if, in despite of the destructive Mixtures demonstrated to have been used with the Waters, they have nevertheless been salubrious, how much more might they have proved so, had they been free from such disadvantage,

disadvantage, and prescribed with proper Assistance, from Pharmacy?

I well know, the Gentlemen of the Faculty who have been long resident at *Bath*, will reply to this Observation, what the Quicksilver *Dover*, and such other Pretenders to Physick, have always urged to the weighty Arguments that have been advanced against their Doctrine, namely, “ Experience is all in all; for
 “ (say they) Cases in which these
 “ Waters have been to this Day used
 “ as an effectual Remedy, will al-
 “ ways be the Cases for the Cure of
 “ which Patients will resort to *Bath*;
 “ and as we are taught by daily
 “ Observation, how they have been
 “ prescribed in Disorders wherein they
 “ have been successful; we are thence
 “ better able to direct their Use, than
 “ the most ingenious Rationalist,
 “ who

“ who has no other Guide than a
 “ Knowledge of their Principles can
 “ be supposed to be.”

“ And we well know few Men are
 “ able to judge of the Convictions
 “ arising from chemical Experiments,
 “ but when any Person has recover’d
 “ of a Disease by the common Prac-
 “ tice, such a Recovery will be at-
 “ tributed to the Doctor, under whose
 “ Care it was performed, even tho’
 “ the Medicines he took had been
 “ ever so insignificant, or so injudi-
 “ ciously apply’d, and tho’ Chance,
 “ and a good Constitution, may have
 “ done much more in performing the
 “ Work, than any Sagacity or Skill
 “ in the Director.”

“ What will it avail therefore to us
 “ whether the Waters are, or are
 “ not, impregnated with this or that
 “ Principle, so long as they continue
 “ to

“ to be the same as they have hither-
 “ to been, and are found effectual,
 “ in conjunction with such other
 “ Aids from the Shops, as have from
 “ time to time been administred with
 “ them? ”

But in answer to all this specious
 Shew of Argument, it may be suffi-
 cient to observe, That the same che-
 mical Knowledge which discovers the
 true Contents of the Waters, will
 direct the Physician not only to avoid
 the Use of improper Medicines with
 them, but enable him also to censure
 bad Practice, and to point out what
 is good.

He, for example, must know, that
 the Admixture of Soap, or of any
 fix'd or volatile Alkali, given with
 the Waters, will destroy their Nature
 and Efficacy; and on the other hand,
 that the Union of the Waters with
 proper

proper homogeneous Substances, will in some Cases add to their Virtue.

Thus a Practitioner versed in Chemistry, is not only on the Level with him whose Experience is all in all, but knows further how to increase the Virtue of the Waters; whereas the Man of mere Experience may, through his Ignorance in Chemistry, totally destroy their Efficacy; at best, it is a great Chance if he does not.

And if what the learned Dr. *Shaw* observes, in the Introduction to his Translation of *Hoffman's* Treatise on mineral Waters be true, Chemical Experiments are as likely to afford Rules for a successful and rational Administration of Medicine, as an Acquaintance with the modern Practice of Physick. His Opinion is, that

“ Phy-

“ Physicians prevent themselves
 “ from learning the true Virtues and
 “ Effects of Simples, by the crowded
 “ Manner, Variety, and complex
 “ Mixture wherein they prescribe
 “ them, which renders it impossible
 “ for them to form a true Judgment
 “ of the Virtue and Power of any
 “ one Ingredient; insomuch that if
 “ the Patient happens to recover, it
 “ is uncertain, in a Variety of Me-
 “ dicines exhibited, to which of them
 “ the Cure was owing, *so as on the*
 “ *like Occasion successfully to employ*
 “ *the same again* : Where is then the
 “ Advantage of the much boasted
 “ Experience ?

The same Observation my Lord
Bacon has made, and with exact Dis-
 cernment, censures the Conduct, in
 these apposite Words.

“ To

“ * To see the daily Labours of
 “ Physicians, in their Visits, Consul-
 “ tations, and Prescriptions, one
 “ would think that they diligently
 “ pursued the Cure, and went di-
 “ rectly in a certain beaten Track
 “ about it; but who ever looks at-
 “ tentively into their Prescriptions
 “ and Directions, will find, that the
 “ most of what they do is full of Un-
 “ certainty, wavering, and Irresolu-
 “ tion, without any certain View
 “ or Foreknowledge of the course
 “ of the Cure.”

To make further Remarks there-
 fore on such specious Arguments, or
 to endeavour to confute such as pre-
 fer an empirical to a rational Practice,
 cannot be requisite; and for that
 reason, having said thus much, I shall

* *Shaw's Translation of Bacon.* p. 103. Vol. 1st.

content myself, with the very old and trite Phrase.

Qui vult decipi decipiatur.

For though the Title of Doctor may, from the Place or Manner of it's being conferred, give a greater or lesser Sanction to the Physician; yet it is certain, it can no more add to his physical Capacity, than does the cut of a Sleeve to the Learning of a Master of Arts, or the Length of the Beard to the Wisdom of a Philosopher.

Notwithstanding therefore the regular Method of Study observed in Universities, may tend to polish the Stile of a Writer, or give a more elegant Taste in the Belles Lettres; yet it is not impossible but as much useful Knowledge in Physick, or any other Science may be elsewhere obtained; and though there are many
Gentlemen

Gentlemen who pride themselves in their academical Educations, and despise every Qualification not obtained in a College: I with Pleasure confess (and therein I am kept in countenance by my Friend Dr. *Lucas*) that I received the first Rudiments of Physick in the Shop of an Apothecary, in which I had an Opportunity not only of being acquainted with the Variety of Articles in the *Materia Medica*, of seeing what would, and what would not unite, and by what means their Union was to be perfected, but likewise of observing their Effects on different Constitutions, in different Diseases, under the Direction of many able Practitioners; during which time I had the Benefit of reading those Lectures considerately, which were compiled by the learned *Boerhaave* and others, for the Instruction of their

Pupils, while the Students in our Universities, however well they are there instructed in theoretic Reasonings, have little or no Opportunity of seeing the Maxims they receive in their lectures, confirmed to them by Practice.

With Justice therefore is it remarked, that there may be Apothecaries who are not Physicians, though no Man can be deservedly called a Physician, who is not skilled in Pharmacy. Even the Fathers of Physick, *Hippocrates*, and *Galen*, we know were as much Apothecaries as Physicians, and greatly distinguished by their Art in preparing and compounding Medicines.

Nay, in the earlier Ages, all Physicians prepared their own Medicines, and continued so to do till the *materia medica* became so crowded as to make the care of it a sufficient Employment

ployment for any one individual; whereby that which till then had been but one Branch of a Science, was converted into a Trade, and such a Variety of dishonourable Artifices have by the course of time been introduced therein, to render it more lucrative, that now, we have one Medicine often used as a *Succedaneum* for another, and few amongst the many hundreds in vogue are duly prepared.

How therefore is the Physician's Reputation to be supported, if he be a Stranger to the distinguishing Characteristics and Qualities of Medicines? His Dependance must, in such case, be intirely on the Skill and Fidelity of the Apothecary, who is often incapable of answering for the Genuineness of his Medicines, because they are not prepared by himself, but procured from the Shop of some Drug-

gift or Chymist, on whose Integrity he likewise has depended.

This every one conversant in Practice must have often known to be the case, and therefore every Physician who has any regard for his own Honour, or for the Welfare of his Patient, ought to make himself well acquainted with the Names and Synonima, the choice Preparation and Virtues, as well as the Methods of prescribing of the several Articles in the *materia medica*, before he presumes to direct their Use.

Nay, if he would make it a Rule, when he has an Opportunity, to look to the preparing the particular Medicines himself, it would be very commendable.

Until therefore by the Laws of our Country, the Legislature shall appoint Inspectors into the Shops of Apothecaries without the Bills of Mortality, as they have within, I wish,

wish, for the sake of the Public, that every Physician would make himself Censor, so far as his Practice extends: It is really his Duty to do so, and his having done it, will afford him many pleasing Reflections, when, in the Decline of Life, he withdraws himself from the Fatigue of his Profession.

But leaving this Digression, and returning to the first Design of this Undertaking; I shall endeavour, from the Truths manifested by Dr. *Lucas's* chemical Experiments, to drop a few Hints towards pointing out a more rational Method of administering the Waters of *Bath*, than is generally pursued, on which a more spacious Superstructure may be hereafter raised by a more able Hand; and the Public taught in what Cases these Waters are useful, and in what they are prejudicial; on the Knowledge of which,

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the Credit of the Waters, the Reputation of the Physician that directs their Use, the Welfare of the Patient who drinks them, and the Prosperity of *Bath*, must at all times depend.

I am not insensible, that although it must be universally allow'd, that chemical Experiments have demonstrated to us many Substances contained in the *Bath* Waters, and in the Waters of many other medicinal Springs; yet as it is evident from the Infusion of Antimony in Wine, and many other Experiments, that Liquors may be impregnated with a variety of Substances, whose Natures are too subtil to be discovered by any known Experiments; it will not follow, of an absolute Certainty, that the Effects produced by any mineral Water, must be the Consequence of it's discovered Principles only.

It

It may therefore, with some Shew of Reason, be objected, that no particular Conclusions should be made on the Virtues of these, or any Waters, from the Ingredients they have been proved to contain, as it is not impossible but from some other undiscover'd Article, in Conjunction with those already discovered, it is, that the natural Waters are the very powerful Medicine, they have by Experience been proved.

But till such over-scrupulous Gentlemen have exhibited some Experiment on the Waters, the Phænomena of which cannot be accounted for from the Nature and Qualities of their known Contents, whereby we may have some Reason to suspect they do contain an undiscovered Principle; it will by no means be right to be busied about Shadows and bare Possibilities,

or

or to argue at all about we know not what. And since it is fully demonstrated, by a regular course of established chemical Experiments, that *Bath Waters* are a Compound, and not a simple Medicine; and that tho' they are enumerated amongst the *Thermæ* or hot Springs, they are at the Fountain-head truly *acidulæ*; (as they contain, in conjunction with a bitter, neutral, purging Salt, a Portion of Sea-salt, something of an oily Nature, a calcarious Earth, a truly volatile, vitriolic, acid Spirit, united with their Chalybeate Principle.) As all these Ingredients exist in the Water at the Spring-head, and are blended together by a particular Degree of Heat, which may not a little contribute to their singular Efficacy,

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It must be highly requisite, before we can prescribe them rationally, that we should know the Virtues and Qualities of each particular Ingredient, when the same is separated from the Waters, and that the Alterations which they unavoidably undergo by their Union together, and the Powers of the whole when united, should likewise be considered; as thereby their Powers and Effects may be greatly altered, from those they possess'd while they continued uncompounded.

Now daily Experience testifies, that different Constitutions are differently affected by the Use of *Bath Waters*; for they render some costive, and others they purge; at which we need not wonder, if we consider what has been mentioned so often before, that they are not a simple but a compound
 Medicine,

Medicine, and that they have astringent, as well as aperient Ingredients in their Composition, which it is impossible should be so accurately proportion'd in their Parts, as to be adapted to every Individual; nay indeed, it is impossible that any compound Medicine should be so adjusted, in all its Parts, as to agree with every one that takes it. Why then should we expect more from *Bath Water*, which is only a natural compound Medicine? And why should we imagine, that when the Waters disagree with the Stomach, there should be no other Method of correcting that Fault, but the ordering them to be taken in a smaller Quantity, or blended with other Medicines? when it is evident that each of the above recited Principles in the Water, is capable of producing it's proper Effects, and may be adapted

to

to different Constitutions and Diseases. Is it not therefore the Business of the Physician, to increase or lessen each of the Ingredients which is separable from the Waters, as the Case may require? and not to order a crowd of other Medicines to be taken with the Waters, or such a small Quantity of them, as can answer no manner of good Purpose?

It is not impossible indeed, that Medicines of a similar Quality to the Contents of the *Bath* Waters, may be found out to be added to them, as occasion may require; whence it may be unnecessary to employ the requisite Time and Trouble for separating the constituent Parts of the Waters from each other for that purpose. But, to this I must reply, That our Senses are not to be rely'd on in judging and distinguishing of the
nice

nice Differences that may arise, in seemingly similar Productions of Nature, as shall be fully proved in the Sequel of these Sheets; and for this Reason it is clear, that so far as the Waters will afford us the requisite Helps for correcting the Defects of them in their natural State, such Helps ought to be preferred to Productions that may appear to be similar, not obtained from the Waters.

And as it is certain, that the Virtue of the saline and fixed Parts of these Waters, like most other powerful Remedies, depends on their being exhibited in a certain Dose; and as particular Cases may require more of these fixed Parts than is contained in such a Quantity of Water as a sick Stomach will bear; it cannot be irrational, in such Cases, to have these Salts separated from the Waters, and

a Solution of them in a small Quantity of the same Waters, occasionally added to each particular Dose at the Fountain-head; as by that means they, in particular Cases, may not only be made agreeable to the Stomachs of the Sick, but every Good obtained, which the seperate Ingredients of the Waters, or the Waters themselves in their natural State, could in such Cases produce.

By this Practice, the real Efficacy of the Waters will in time be demonstrated; and upon Experience I have found it is a Method not only rational, but successful; as Mr. *Have-land*, a learned and accomplished Apothecary in *Bath*, who has prepared for me the Salts of these Waters, can testify.

From what I have here advanced, it is not impossible but some may imagine,

gine, that I would not willingly allow the Use of Shop-Medicines in a course of these Waters: But as I am truly sensible that Medicines and the Waters not only may, but often are used together, to the mutual Augmentation of the Powers of each other; I would not have what I here write, be so misunderstood:

For I am convinced, that Medicines are requisite to be taken by many Persons, before they begin either the outward or inward Use of these Waters; and on the contrary, that in some Constitutions and Disorders, the external and internal Use of the Waters, are an excellent Preparative for a course of other Medicines.

I would therefore be understood to say only, that if *Bath Waters*, or their several Ingredients, be proper Remedies for the Cure of any Disease,
in

in such case the Patient should be permitted to use them fairly, without having his Constitution oppress'd by a Struggle betwixt the Action of the Waters, Shop-Compositions, and a Disease at the same time; for there is no Maxim in Physick more indisputably true, than that, though a few Medicines, properly administred, have at some times done great good, yet a great Number and Variety of them, will generally, if not always, do Mischief *.

But where neither the Waters, nor their constituent Parts, are proper, it is scarcely honest to give them in insignificant Doses to a Patient, and

* Varietas remediorum ignorantiae, filia est.

Verulam.

Plebeios magis liberari a peste, quam divites, qui multis medicamentis untur. *Sanctorius*, S. I. a. 139.

Nil æque Sanitatem ægrotantium impedit, quam remediorum crebra mutatio. *Seneca Epist.* 2.

to load him at the same time with a Tribe of Shop-Medicines, by which means Patients have been too commonly deluded with a Belief, that they have been cured by the Waters, when, in fact, their Recovery has been owing only to the Medicines from the Shops, with which they might as well have been relieved at their own Homes, at a much less Expence, than it was possible they should be in the City of *Bath*.

And, on the other hand, it has too frequently happened, that Patients have been sent away unrelieved from *Bath*, who might have had certain Cures from the Waters, had they not been given in too small a Quantity to produce any Effect, or counteracted by incongruous Shop-compositions.

CHAPTER THE SECOND.

Of the volatile, vitriolic Acid in Bath Waters; it's Nature and Uses; and of the Changes the Virtues of the Waters undergo by it's Separation from them.

THAT these Waters are impregnated with an Acid, that this Acid is volatile, and that by means of it's Union with some ferruginous Matter, it is made vitriolic, Dr. *Lucas* has demonstrated by many established Experiments *. And from this chalybeat Principle, which the volatile Acid of the Waters keeps suspended in them at the Spring, it is, that these Waters, like every other

* ESSAY ON WATERS, before referred to.

Solution of Iron, become capable of acquiring a purple Hue, on the Admixture of any astringent vegetable Tincture; but as this Acid is volatile, these Waters immediately lose that Property, together with their Transparency, when they are become cold, and with their Pellucidity regain the same again, on the Addition of another Acid, in a proper Proportion.

Whence it cannot be doubted, that this chalybeat Principle in the Waters, is a Solution of Iron in a volatile Acid; and whether, as *Hoffman* and *Shaw* think, the Iron flies off with the volatile Acid, or, as Dr. *Lucas* with more Reason affirms, the Iron precipitates on the Exhalation of the Acid alone, it matters not, as to the medical Effects of the Waters; for by either means, they will certainly be deprived of every Efficacy they had from their
reputed

reputed volatile Steel, or vitriolic Gas, so long as they continue unmixed with any other Acid, by means whereof their Iron may again be dissolved.

And therefore as this, like every other subacid Solution of Iron, is of a styptic, or astringent Nature, while it exists in the Waters; it must consequently render them prejudicial in pulmonic Complaints, in Disorders of an inflammatory Nature, and where the Contents of the Bowels have acquired a putrid State; though at the same time, where the Vessels are sound, the Circulation of the Blood languid, the contractile Power of the Fibres weak, and Nature in want of Strength to expel the Humours from the Center to the Surface, no known Medicine can be better adapted to expedite a Separation of the morbid

Humours from the Blood, and to invigorate the Constitution, than the Solution of Iron in this volatile vitriolic Acid of the *Bath Waters*.

Hence it is manifest, that although this vitriolic Salt renders these Waters prejudicial in Coughs, Inflammations, and hectic Constitutions, as the same is volatile, it may with very great Ease be thrown off from the Waters, and thereby every Objection to the Use of them, on account thereof, immediately removed ; for if the Waters are kept but a few Hours after they are taken from the Spring, or if they are made warmer than natural by the assistance of Fire, the whole of this volatile acid Spirit which dissolves the Iron will be exhaled, and thereby the Waters rendered a good Medicine in those very Complaints, in
which

which they would before have been hurtful.

This Observation may, by many historical Facts, be fully confirmed; but as it is a Truth which every rational Practitioner would expect, who considers the Qualities of the fixed Principles in the Waters, when they are divested of those which are volatile, one Instance alone must be sufficient to confirm the Observation; and as the following Case was related to me by my ingenious Friend, Dr. *Nugent*, late of *Bath*, to whom any Person who is in doubt may apply to be certified of the Fact, I shall give this the Preference to any other.

The Case of Mrs. Colborne.

In the Year 1747, one Mrs. *Colborne*, then aged about fifty two, or fifty three Years, had a scorbutic,

gross habit of Body, and was subject to erysipelatous Eruptions, with a very troublesome, periodical, hemorrhoidal Flux, on the Cessation of which, and the going off of the Eruptions, she gradually lost her Appetite, and became troubled with violent rheumatic Complaints, and an indolent Tumor in the right side of the *Abdomen*, just below the Edge of the Liver, by the Continuance and gradual Increase of which, for eighteen Months, she was reduced to a great degree of Weakness, and could keep nothing upon her Stomach that she took to support her Strength.

Thus circumstanced, *Bath Water* was judged to be a Medicine deserving of a Trial, to which, though she was then in *London*, she had immediate Recourse. And altho' the most powerful stomachic Medicines had
before

before been ineffectually administred, the *Bath* Waters alone, not only soon strengthened her Stomach, and enabled it to retain proper Aliment, but likewise greatly relieved many of her other Complaints.

This induced her to believe, that as the Waters, at so great a distance from their Source, had given her such remarkable relief, they would certainly afford her much greater Benefit, was she to drink them in their highest Perfection at the Spring-head.

But when she came to *Bath*, and by the Advice of her Phyfician, began to drink the Waters at the Spring, in a few Days time she was fully convinced of the Error she was in; for they aggravated all her Symptoms, and heated her Blood to so great a degree, as obliged her to desist from
their

their further Use. But not discouraged by the first Instance of their ill Effects, when the unexpected Symptoms, the Waters had excited, were removed, she made a second Attempt, in hopes of better Success. And being thereby fully convinced of the Impropriety of them, in their natural State, she contented herself with drinking them when they were become cold, and divested of their volatile vitriolic Gas, in which State they were salubrious, as they had before been; for they strengthened her Appetite and Digestion, as well as mitigated her rheumatic Pains.

Does not this Case alone sufficiently demonstrate, that *Bath* Waters may, by proper Management, be rendered beneficial in Diseases wherein, in their natural State, they are highly improper?

Does

Does it not confute those innacurate Observers, who, from some private View to their own Interest, or any other Motive, pronounce *Bath Waters* as insignificant as common Water, unless they are drank at the Fountain-head?

Indeed, was there no Example to prove, that *Bath Waters* are an effectual Medicine in many obstinate Disorders, when they are drank at a distance from *Bath*, Reason alone would induce us to believe it; for as the Salts and all the fixed Parts continue in them, they must also, in some measure, retain their Virtues and Qualities.

But, as there is no Medicine capable of doing mischief, when improperly taken, but will do good, if prudently administered; this chalybeat Principle in the Waters, tho' prejudicial in some Cases,

Cases, will nevertheless be of the utmost Benefit in others.

It is therefore to be wished, that some Process could be discovered, whereby we might collect this volatile vitriolic Spirit from the Waters, in a separate State, that so it might occasionally be added to them, in Cases wherein this Principle of the Waters may be chiefly indicated, when the Waters in their natural State may be found too sparingly impregnated with it.

But if we consider how very fugitive the volatile Particles are found to be, not only of this, but of every mineral spring, we must be instantly convinced, that the Attempt to obtain them in a separate State, is an impracticable Project. Nay indeed, not only the Subtility of the volatile vitriolic Principle in *Bath* Waters renders it

it incapable of Confinement; but when it is separated from the Waters, it flies off incomplete: For it is the Acid only which escapes, while the chalybeate Principle precipitates; otherwise the Waters, as was before observed, when they had once lost the Power of acquiring a purple Colour from the Infusion of Galls, could never regain the same on the Addition of any other Acid; for the Acid has no such Property in it's own Nature, but the reverse, and consequently could not give it to the Waters.

And therefore, as it is manifestly impossible to collect, in a separate State, this volatile vitriolic Salt, it must be our Duty, from the Knowledge we have obtain'd of it's Nature, to contrive a Medicine as nearly similar to it as we can, which may occasionally

occasionally be added to the Waters when they are not found sufficiently enriched with it at the Spring-head.

For Instance, we know that Salt of Amber is a kind of volatile acid Salt, capable of producing the Effects of a mild Acid on mineral Substances : Suppose then Filings of Iron were to be rubbed in a marble Mortar with Salt of Amber, and suffered to stand together in a glass Vessel, till the Salt has in some degree corroded the Iron, without having intirely spent it's Acidity; then, as it is the Property of this Salt to dissolve perfectly in rectified Spirit of Wine, by the Addition of this Spirit, we may obtain a Tincture, which is a Solution of Iron in a subtil Acid, more similar to what is contained in the Waters, than any Medicine now known in the Shops. By a proper Addition of this to the
Waters,

Waters, where the Chalybeat Principle is deficient in them, we may reasonably expect them to be rendered infinitely more efficacious than they could be, were they to be taken without such an Assistant.

By such Help the Waters would sooner strengthen the Stomach, brace up the relaxed Fibres, exhilarate the Spirits, attenuate the Blood, and throw out any Acrimony from it on the Skin, than it is possible they should do in their natural State.

As therefore it is evident, that the supposed volatile Parts of these Waters, to wit, the Iron dissolved in the volatile vitriolic Acid, are the Ingredients which give them the invigorating Power observed in those who continue their Use, and that all the Heat, and the Symptoms of an accelerated Circulation, common

mon to the Drinkers of them, are thereby produced; having shewn how and by what means that Principle, and consequently the Effects thereof, may be taken from, or increased in the Waters, it leads me in the next Place to enquire into the Nature, Qualities, and Virtues of their fixed Principles, amongst which the neutral Salt they contain is first to be considered, as that is the next Ingredient, which is separable from the Waters by the means of CrySTALLIZATION.

CHAPTER THE THIRD.

Of the bitter, neutral purging Salt, contain'd in Bath Waters ; it's Nature, Qualities, and Effects ; and of the evident different Virtues of certain saline Substances, not distinguishable by the Senses, one from the other.

THE first Salt, procurable by Evaporation and CrySTALLIZATION from *Bath Waters*, is by incontestible Experiments, proved to consist of the Basis of Sea Salt, which is the mineral Alkali, united to the vitriolic Acid. This, in no Sense, appears alkaline after this Union ; but, on the strictest Examination, is
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found perfectly neutral: Whence it must be an undeniable Consequence, that the Salts, in their neutral State, do contain an Acid, by means whereof the alkaline Quality of the calcarious Earth is neutralized; for by the Union of an Alkali and an Acid, in proper Proportions, a neutral Salt will always be produced; and there is not known in Nature, any Means or Method, besides the Union of an Acid with an Alkali, by which a neutral Salt can be obtained.

As these two Principles are more strongly or weakly combined together, their Efficacy in Medicine will be greater or less; for the more intimately they are united, the further will they force themselves into the Vessels, and will circulate longer in the Blood unchanged, than they could do, were their constituent Parts easily separable one from

from the other, on their Entrance into the first Passages.

The learned Dr. *Huxham*, in his ingenious Treatise of *Antimony*, has observed, that all Salts differ in their Effects, according to the different Earths with which the universal Acid is united.

And many other learned Writers, speaking of the Salts in medicinal Waters, affirm, that although there be a great Variety of them, they are all produced by one universal Acid, so connected to some terrene Substance, as to render the same dissolvable, or infinitely divisible in Water.

Yet Experiments demonstrate to us, that a pure fixed Alkali, saturated with the Acid of Sea-Salt, will reproduce Sea-Salt; that the same Alkali saturated with the Acid of Nitre, will regenerate Nitre; whilst united with

the Acid of Alum, Sulphur, or Vitriol, it will constitute vitriolated Tartar; and the two last Acids, with volatile Alkalies, will produce the same Salts, in a semi-volatile State; and with the first, a true Sal Ammoniac.

Whence we may, with just Reason, question the Verity of the former Assertions: For, different Earths, dissolved in the same universal Acid, do produce Salts of different Effects and Qualities; and the same fixed Alkali, with the several different Acids, constitutes different saline Concretions, of different Powers and Virtues.

And it is likewise evident from the same Observations, that, unless the particular Quality and Nature of the terrene Principle, in any saline Substance, as well as the Acid, by which it

it is converted into a Salt, be perfectly known, we cannot understand it's several Qualities, or with due Precision direct it's Use. How just therefore is that Remark of the learned *Boerhaave*, when, in treating on saline Bodies, he says, that “ they are of
 “ so particular a Nature, when ap-
 “ plied to our Bodies, and their Ope-
 “ rations so intricate, that they are
 “ hard to be explained. ”

Indeed, the Nature of saline Bodies, and their Effects on Animals, can only be demonstrated by Experiment and Observation ; for many of the saline Substances now used in Medicine, are so similar in their sensible Qualities, that it is impossible to distinguish them from each other, by the meer Test of our Senses ; yet we well know, that upon being applied to our Bodies, they

produce very different Effects: From whence we should learn, not to rely on the bare Testimony of our Senses, as a Criterion, whereby to judge, or discover the nice Differences, observable, in the Qualities of seemingly similar Productions of Nature; for this can be determined by Experiment only.

A few Examples to this Point will shew how unjust and inexcusable it is, to substitute one Article in a Medicine, instead of another, however similar in appearance; and likewise, how much more rational it must be, to exhibit the Salt of *Bath Water*, in conjunction with the Waters, in Cases wherein the Efficacy of the saline Part of them is most required, than, as is the present Mode of Practice, to prescribe *Glauber's*, or any other Salt of similar Appearance in it's stead. Let

Let a Relation of the following Facts more strongly testify the Truth of this interesting Remark; the best Reasonings being insufficient, to introduce any Innovation repugnant to established Methods of Practice; and nothing more difficult to conquer, than popular Prejudices, in favour of long received Opinions.

In the Year 1746, a young Gentleman, eighteen Years old, for whom I had the Honour to be consulted, but whose Name I am not at liberty to mention, was much troubled with a leprous Disorder, which grievously afflicted both his Arms and Legs, and, for Years before, had been gradually increasing upon him, notwithstanding mercurial, antimonial, and the most powerful Medicines, and medi-

cinal Waters had been regularly used to prevent it.

His Appetite was very bad, his Digestion weak, his Pulse oppress'd, his Breathing difficult, and at all times, when the dry scurfy Eruptions were not in great plenty on his Skin, his Sight was dim, and he had great Pain and Giddiness in his Head.

Having read and heard the Salt of Vipers much recommended in such Disorders, and imagining it to have no other Virtue than Salt of Hartshorn, or any other animal volatile Salt, from which, by the nicest Examination by our Senses, it is not to be distinguished; I prescribed for him from ten, to twenty Grains of Salt of Hartshorn, in a small Quantity of the liquid Extract of Guaiacum, to be taken three times a Day,

Day, and ordered it to be washed down, with a very weak Infusion of *Virginia* Snake-root, which, in a short time after every Dose, visibly encreas'd all his Complaints, and obliged me to desist from it's Use.

Sometime afterwards, accidentally mentioning the Case to a worthy Gentleman of the Profession, he furnished me with some genuine viperine Salt, of his own preparing. Of this I gave my Patient some few Doses, made up in the same Quantity and Manner, as I had before done the Salt of Hartshorn; and by means thereof, all his Complaints soon were mitigated, and he was freed from every Appearance of the Disease in little more than a Month; during which time, he repeatedly tried the Salt of Hartshorn, but never once without being greatly worse for the Attempt.

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But, as all deep-rooted Disorders are liable to return, and as this in particular is with great difficulty eradicated, this Gentleman is, once a Year, in the Spring-Season, slightly affected with his former Complaints; for the Removal of which, he has learned by Experience, to have recourse to no other Help, than taking internally, an Electuary composed of the Powder of Vipers, the viperine Salt, Sugar, and Saffron, and externally frequently washing the Eruptions with common Gas Sulphuris *, which is a Medicine somewhat similar to the Vapour of *Bath Waters*. By this means, in a few Days, he is constantly cleared from his scurfy Erup-

* Gas Sulphuris is not a Solution of Sulphur, but Water impregnated with the Acid of Sulphur only; which is necessary to be united with Phlogiston, for the Formation of Sulphur; it does not follow, therefore, that because Waters contain this Acid, that they are sulphureous.

tions,

tions, and freed from every other Symptom of his Disorder, for the rest of the Year.

As the Case here recited, is an Instance which only shews, that volatile Salts from different Animals, though of exactly similar Appearances to each other, may be endued with manifestly different Qualities and Virtues; and as the Salts in *Bath Waters* are not volatile, but fixed, it may by some be objected, that the Application of this Case to the Salts of these Waters, is unjust: But to this, I answer, That if our Senses are not to be trusted in guiding our Knowledge of the one, there can be no Reason why they should be relied on in the other.

The learned *Hoffman* gives the clearest experimental Proofs of an essential Difference between fixed Alkalies, obtained by Calcination
from

from different Substances, contrary to the received Opinion. He shews essential Differences between the Alkali extracted from Nitre, that from Tartar, and that from burned Vegetables; and then infers, most justly, that certain volatile, sulphureous, or oily Principles may so adhere to, and lie hid in, Bodies suffering the utmost Torture of Fire, as to constitute the Differences he demonstrates*.

Indeed, as there is nothing of greater Consequence in the Cure of Diseases, than that the Medicines directed should be faithfully prepared, and the Intention of these Remarks, is to induce Practitioners not to use one Article in Medicine instead of another; I shall not spend more time in

* See *Hoffman's* Observationes, Phys. Chym. Obs. xxix.

reasoning on the Matter; but shall leave my Readers to be convinced of the essential Differences of fixed Salts, of similar Appearances, from the preceding Considerations. To shew how neuter Salts differ, the following Facts, which were communicated to me by Mr. *Haveland*, whom I have already mentioned, and of whose Veracity I am confident will be sufficient.

A certain Gentleman, who was a Customer of his, and had been much habituated to the free Use of his Bottle, was frequently troubled with violent Pains in his Head; to remove which, he had recourse to the Salts extracted from the justly celebrated Springs at *Scarborough*, and by means thereof, he constantly obtained immediate Relief; but as Wine is almost always to be had, and Intemperance in
any

any Place may be committed, it sometimes so happened, that he had a Return of his Pain, when he was not within reach of any true *Scarborough* Salt, which induced him to substitute *Glauber's* Salt in its stead, which he frequently did, but never once without being made worse, instead of better, from the Use of them.

Another Instance of the *Scarborough* Salts, agreeing well, and proving most salubrious, where those of *Glauber* had a quite different Effect, is a Lady now resident in *Bath*, who frequently has had Recourse to the first without the least Inconvenience, but whenever she has been necessitated to use the latter, she has constantly found them produce Sickness and Gripes.

Nay the Salts which are faithfully prepared, according to the Prescription

tion of their Inventor Glauber, whose Name they bear, and those Salts which are made at *Lymington*, or other Places, which are constantly sold in the Shops for *Glauber's Salt*, and by one Practitioner or another almost every Day prescribed instead of the neutral Salts obtained from most of our known mineral Springs, are so similar in their Appearance, as not to be distinguished one from the other by any Examination of them with our Senses.

Yet if an Ounce of the true and the like Quantity of the spurious *Glauber's Salt*, be dissolved in separate Glasses of distilled Water, and an equal Quantity of a clear Solution of fixed Alkali, be added to each, very different Consequences will instantly ensue ; for although the Solution of the true *Glauber's Salt*, will
scarcely

scarcely become turbid, the Solution of the Spurious will deposit near two Drams of calcarious Earth, which, after repeated Ablutions, affords a Powder analogous to the much noted Medicine, called by the Name of the white Magnesia.

How manifest therefore is it, that these two Salts are widely different one from the other? and that the true consists of the vitriolic Acid saturated with the mineral Alkali? and that the spurious is nothing more than the same Acid saturated with the absorbent Earth? Notwithstanding, by shameful Ignorance and Avarice, they are kept and sold in the Shops under the same Name.

After maturely considering these Remarks, every one undoubtedly must be convinced, that a Knowledge of the Nature and Qualities of the fa-
line

line Parts of *Bath Water*, is indispensably necessary to all those who presume to direct their Use; and that whoever takes upon him to prescribe them without that Knowledge, must attribute his good or bad Success to Chance or Accident only. And although nothing but a careful Attention to their Effects upon animal Bodies, can fully demonstrate to us their several Virtues and Powers, in altering the Nature and Texture of the Particles of our Blood and Humors; yet as proper Instances have not hitherto been recorded, from whence necessary Observations can be made, it is our Duty to take the best Helps we can have, to guide us to a rational Administration of them; and therefore although it is

in some Instances clear, that seemingly fimilar Subftances may, and do produce different Effects ; yet, as this is not always the Cafe, till fuch times as Experience has proved to us the Qualities and Powers of any one Medicine, we cannot, on any better Foundation, ground our Judgment of it's Virtues, than by obferving what Effects are produced by other Medicines of the fame Clafs, efteemed to be of the fame Nature and Qualities, and which, upon chemical Examination, are feparable into the fame Principles.

As therefore, the Salt of the *Bath Waters*, is not only proved to contain an Alkali and an Acid, like every other neutral Salt, but likewise to produce the fame Effects
which

which other neutral Salts do, on their Admixture with other Substances; and as neutral Salts, in common with each other, possess many general Qualities, while each, and every of them, have certain particular Powers; we ought, till such times as the particular Qualities of the *Bath* Salts are discovered, to administer them like other neutral Salts, the general Effects of which, as Medicines are now well known, and, by daily Practice, proved to be astonishingly great: For, amongst Medicines, Salts are found to be of the utmost Consequence, both in preventing and curing Diseases, as every one conversant in Physick must know. And the most learned Writers allow, that Salts of various kinds are continually floating in

our Blood; and frequently prove a principal Foundation for Distempers.

Amongst the whole Tribe of saline Medicines, it is remarkable, that there are none so useful or salubrious, in so many Disorders, as those we call neutral; especially those which are obtain'd from medicinal Springs; for they are generally found to be similar to those of the Blood, in which the Salts, in their natural State, are all neutral.

For though acid Juices are frequently generated in the *Primæ viæ*, from crude or indigested Aliments, and are productive of violent Symptoms; yet, in order to correct them, the Bile, a Liquor of a saponaceous Quality, so nearly ap-

approaching to an alkaline Nature, that it corrects Acidity ; is discharged into the very first of the Intestines.

Both Alkalies and Acids, administered in a separate State, are apt to work violent Changes in the Blood ; the one attenuating, the other incrassating it in extremes ; whereas, when they are neutralized by a proportionate Mixture, they are not liable to produce such Effects ; for, mixed with our Aliments, they are preservative of Health ; and, as a Medicine in the Cure of Diseases, are highly efficacious, correcting all Tendency to Putrefaction, and producing most surprizing salutary Effects, in those chronical Disorders which arise from Obstructions and Infarctions of the

Viscera. They cleanse the first Passages, and deterge the excretory Ducts, allay the inordinate Motion and preternatural Heat of the Blood; and not only correct, but remove every Disorder which is brought on from a redundant Bile.

If the Body is to be rendered soluble, and a Discharge of the Urine promoted; or, if in a State of preternatural Heat, Pain, and Spasm, it is requisite, a free Transpiration should be excited; neutral Salts will most powerfully produce those Effects; for they not only, as was before observed, correct and mitigate the caustic Acrimony of bilious Humours, which lay a Foundation for Choleras, Diarrhœas, Dysenteries, immoderate Nauseas, Vomitings, Burning-fevers, and Inflammations

inflammations both of the Stomach and Intestines, but likewise allay Thirst, and prevent or dissolve any preternatural Spissitude of the Humours, which are the first Causes of Obstructions and polypose Concretions.

Nay more; they prevent saline and tartarous Concretions in the Kidneys and Bladder, as the Practice and Writings of the most distinguished in the medical Art do abundantly testify, and that the Salts of *Bath Waters* have this Effect, in a most wonderful manner, the astonishing Case of Mr. *Long*, recorded in Mr. *Pierce's* Memoirs, and recited in Dr. *Oliver's* Book on *Bath Waters*, unquestionably proves; in this Patient, though all the Humours of his Body had acquired

such a Tendency to Petrification, as rendered him scarce capable of the least Motion; yet he was perfectly cured by the Use of the Waters at *Bath*.

And indeed, the many violent Symptoms, which arise from Stagnations of Blood, in the Vessels of the Stomach, and Intestines, so often attendant on hysteric and hypocondriac Diseases, are by nothing more effectually removed, than by a prudent Use of such kind of Medicines; for they operate by alleviating Spasms, without bringing on subsequent Relaxations; restore a free Circulation, and stop all immoderate Evacuations. In short, these kind of Salts, are known to cool and attemperate the overheated, and to attenuate the too thick

thick Juices of the Body, as well as to evacuate them gently; they regulate the several Secretions and Excretions, and correct the innumerable Diseases thereon Dependant.

How, therefore, can any one deny, that *Bath Waters*, are a powerful Medicine, at ever so great a distance from the Spring; when it is evident, this saline Principle exists in the Waters, let them be taken from the Spring, and kept ever so long?

But, as Self-Interest alone is the great Spring of Action, no one can wonder, the Inhabitants of *Bath* should inculcate a Maxim which so greatly tends, as this does, to the Advantage of the City.

It

It is observable, that although the generality of Writers on the *Bath Waters*, confessedly knew the chief Efficacy of them resided in their Salts; not one amongst them all can be found, who, after the Salts have been separated from the Waters have ever attempted to examine into their Nature, and to describe their Use, either in a separate or combined State; if we except Dr. *Lucas*, tho' they have spared no Time or Pains to demonstrate, how the saponaceous, nitrous, sulphureous, and alkaline Principles, supposed to be in the Waters, have enabled them to be so efficacious a Medicine, as they have proved.

Whence I am induced to hope, that none of those ingenious Gentlemen, who have so long contended

tended for the Existence of Sulphur, Nitre, &c. in the Waters, (if they disapprove of the Plan of this Treatise, or any Sentiments therein,) will presume, in Discredit thereof, to aver, that indisputable chemical Experiments, may mislead my Judgment in directing the Use of the Waters; since the Principles on which they have argued, and on which their Knowledge of the Waters depend, have had Existence only in their own Imaginations.

Nay, as the clearest Mark of an honest Heart, and a Mind open to Conviction, is readily to own a Mistake, when it is proved to be such; especially if the Welfare of Mankind is any ways concerned in the Correction thereof; I hope no
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one will be found such an Enemy to Truth, and so bigotted to the mistaken Sentiments of his Predecessors, as to attempt a Vindication of Opinions fully proved to be erroneous; or labour to shew a Mind, infected with an Itch, which can only be cured by a Non-entity in Nature, a Sulphur procured from the Waters of *Bath*.

CHAP-

CHAPTER THE FOURTH.

Of the second sort of Salt, found to exist in Bath Waters, being Sea Salt; it's known Nature, Qualities, and Effects, as an Ingredient in the Waters, and as a Medicine in the Cure of Diseases.

AFTER obtaining, by Evaporation and Chryftallization, from the Waters of *Bath*, the neutral Salt, considered in the preceding Chapter, by a further Evaporation of the then remaining Residuum, no inconsiderable Quantity of cubic Chryftals, of another kind

kind of Salt, will be procured, which by the several Tests, to which they have been subjected by Dr. *Lucas*, as well as by their characteristic Figure, are unquestionably proved to be Sea Salt.

This Salt consists of a certain alkaline Substance, most intimately united with an acid Spirit of a singular Nature; for, besides the Qualities and Virtues attributed to other mineral Acids, it has many other Properties peculiar to itself; such as enabling Spirit of Nitre to dissolve Gold, and at the same time divesting it of it's solvent Power on Silver.

And it is observable, that this acid Principle in marine Salt, is so intimately and firmly united with it's alkaline Parts, and constitutes
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so solid a Salt, that it is absolutely immutable by the animal Powers; for it is capable of passing through the whole Course of Circulation, without suffering a Separation of it's constituent Parts, or losing that peculiar Flavour by which it is distinguishable from every other known Salt.

Of this Truth, any one may be convinced, by separating the same from the Urine of Animals, or touching the Skin of a Person who sweats, with the Tongue; whereby the perspirable Humour will be found to have the true Flavour of Sea Salt; which it could not possibly have, had not the same, after having been taken in with our Aliment, pass'd through the whole Course of Circulation, and been discharged

charged through the Emunctories of the Skin unalter'd.

How evident therefore is it, that this Sea Salt must be of the greatest Utility or Prejudice to every Individual that takes it; especially if we consider, that when Water is quite saturated with most other Salts, it will dissolve a large Proportion of this, though it was incapable of suspending or taking into Solution, any larger Quantity of those saline Substances with which it had before been charged; a demonstrative Proof of it's great Solubility, and of the great Influence it must have, in removing Obstructions formed in the minutest Vessels of the Body, into which other Salts could not possibly enter.

Indeed

Indeed, this Salt is an Article of the utmost Importance in Life. It is said, of a learned Professor, little, if at all inferior to any who have inlightened the Science of Physic, that he frequently declared to his Pupils, that any Man's Life would not be mispent, who employed it entirely, successfully, in the Discovery of all the Properties and Virtues of Salt. Certain it is, that all it's inherent Qualities are not yet fully known; this, Time, and Experiment only can discover to us; yet, from the Experience we have had of it's Use, we are clearly convinced, that it not only prevents the Corruption of dead Flesh, gratefully seasons our Aliments, and keeps them from Putrification; but, by it's resolvent Quality, powerfully incides and attenu-

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ates, by gently exciting the contractile Power of the Fibres ; it effectually braces up the relaxed Coats of the Stomach, dissolves viscid Humours therein, restores lost Appetite, and promotes Digestion. It is likewise anthelminthic, removes Obstructions in the Glands and smallest Vessels, and prevents the several Diseases thence arising ; resolves Infarctions of the Viscera, one of the Causes of Flatulence, and keeps the Body soluble, if properly administered internally ; and, by external Use, it powerfully discusses Tumours, cures the Itch, and wonderfully corrects the putrescent and sharp Intemperies of inveterate Ulcers.

Whence we may reasonably conjecture, that, as this Salt is in no
small

small Proportion separable from *Bath Waters*, they receive a great Share of their Efficacy from it's Junction with the other Principles in them.

It is to this Salt, that Sea Water, (tho' but lately restored to Practice, after having, for many Ages, been esteemed a good Remedy in chronical Diseases,) owes it's Virtue. But, the Itch of prescribing a multiplicity of Medicines in every Disease, is at this time so prevalent, that it is scarce possible to learn, from the present Modes of Practice, what any one Simple in Physic is capable of performing.

We find, as Dr. *Lucas* has observed, the many Histories which have lately been published, to recommend the Use of Sea Water, are

so many flagrant Instances of this ; for amongst them all, there are few to be found, in which the Waters were used alone, or not in conjunction with very powerful Articles of the *Materia Medica*, celebrated for the Cure of those very Diseases, for which the Waters were given ; so that it is impossible, from these at least, to deduce any thing conclusive with regard to the Virtues of this famed Medicine.

And therefore, as the Proofs, it's most zealous modern Patrons have produced, of it's Qualities and Power, from the Experience they have had, are not demonstrative ; they leave us much room to doubt, that the Reputation it is honoured with, in the present Practice of Physic, is more than it deserves ; especially if we
consider,

consider, how contradictory the Learned of the Profession have been in their Sentiments on this Subject. For though the Doctors *Frewin*, *Wilmot*, and *Lewis*, concur with Dr. *Russel*, in recommending it's Use in the Cure of scrophulous and scorbutic Distempers; yet, that most shining Ornament of the medic Art, Dr. *Mead*, in his Discourse of the Scurvy, speaking of Sea Water, delivers his Opinion in the following Words;

“ I cannot but say, that I am
 “ sorry to see some of our Physi-
 “ cians, of late Years, so fond of
 “ prescribing the drinking of it to
 “ their Patients, particularly in scro-
 “ phulous Distempers, I am well
 “ assured it has sometimes brought

“ on scorbutic Symptoms, besides
 “ other Mischiefs *.”

How cautious should we then be in entering on the use of a Medicine, which we are assured, by so great Authority as that of Dr. *Mead*, from the Observation of Facts in the Course of his Experience, not from theoretic Reasonings only; has brought on the Symptoms, for the Cure of which it now stands recommended? But such is the Depravity of the present Age, that Custom leads more than Reason; Fashions prevail no less in the Practice of Physic, than in the Modes of Dress. By this means, not only the most trifling Remedies are recommended, and brought in-

* *Mead*, on the Scurvy, p. 110.

to Practice, perhaps after having been long justly exploded, but the most powerful Medicines are rejected and brought into Disuse, from their Misapplication; all from the too common Notion of a Medicine's being good for every thing, or good for nothing.

CHAP-

The first of these is the
fact that the human mind
is not a blank slate at birth.
It is filled with ideas and
feelings which are the result
of the influence of the
environment upon the
child from the moment of
conception.

A second fact is that the
human mind is not a
passive recipient of
ideas and feelings. It is
an active agent which
selects and interprets the
material which it receives
from the environment.
The third fact is that the
human mind is not a
static entity. It is
in a constant state of
change and development.
The fourth fact is that
the human mind is not
isolated from the
environment. It is
in a constant state of
interaction with the
environment.

CHAPTER THE FIFTH.

Of the absorbent Earth in Bath Waters; it's Nature and Uses.

ALL Waters are found to yield by Evaporation, more or less of a fixed earthy Substance; of which, the less they contain, the more wholesome they are esteemed; especially if this Earth be of the hard, petrescent kind; but when it is of a soft, absorbent Nature, easily soluble in a mild Acid, it acts, where it meets with such an Acid, as an inoffensive Salt, and becomes an effectual Remedy for the Cure of those Disorders

Disorders, which the harder kind of earthy Substances commonly produce.

The chief Use of this Earth, in *Bath Waters*, is by it's Union with their mineral Acid, to constitute a kind of a neutral Salt, on which, as is before shewn, the Virtues of the Water in a great measure depend. And though this Earth appears to be partly Selenite when the Water is evaporated; yet, in the natural State, it is completely dissolved in the *Bath Waters*, which therefore appear perfectly transparent, when they are pump'd up from the Spring. Hence it is manifest, that the Earths with which the Waters are thus impregnated, and which they deposit on Evaporation, or long standing, are in the natural State of the
Waters,

Waters perfectly dissolved therein, and become perceptible to the Eye, at no time but when the Waters are in some degree deprived of their Heat, or their volatile Acid, by means whereof they were made saline, dissolved, and suspended.

When once, therefore, the Waters are deprived of their Pellucidity, they immediately begin to be decomposed, and the Earth, instead of being dissolved, only floats about in the Water; when, it is to be feared it can produce no better Effect, than any other impalpable absorbent Powder is capable of producing, however useful it may be thought, while it continues in a saline State, perfectly dissolved in the Waters, at the Spring-head: But Facts, not Conjectures, should alone be permitted

mitted to guide our Judgment and Practice; whence, as no one can positively affirm, till Experience has proved the contrary, that this particular Earth, was it to be separated from the Waters, and given by itself in proper Quantities, might not more effectually, than other Substances, apparently similar, correct predominant Acidities in the Juices of the Stomach, or have some peculiar Virtues in Cases wherein a subtilized absorbent Earth is proper, such as Cardialgia's, unbound Viscera, old Ulcers, Complaints consequent to hard Drinking, and most of the Diseases common to sucking Infants.

This surely deserves, nay demands, to be fairly tried; as Experience alone is sufficient to demonstrate how the Facts may stand.

CHAPTER THE SIXTH.

Of the oily Principle in the Waters.

Nothing is of greater Consequence in Medicine, than an accurate Attention to the nice Differences and Distinctions between the several Productions of Nature: For want of a due Regard to which, many Writers have described one thing for another, and, in consequence thereof, laid a Foundation for misguiding both the Judgment and Practice of the Unwary.

This happens to be the Case, in regard to the Subject of this Chapter; for we find this oily Matter has by some been said to be Phlogiston, or the sulphureous inflammable Principle, by which Naturalists understand

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a simple elementary Matter, which is the general Cause of Inflammability, Colours, and Odours in all Bodies.

This Principle is found to exist both in Minerals, Vegetables, and Animals, and of which when Metals are once deprived, they are reduced to Calces, and lose their metallic Splendor, Fusibility, Ductility, and other Properties.

And 'tis to be observed, that in whatever Body this Phlogiston or inflammable Principle is contained, the same is continually exhaling from it into the open Air, especially when the Bodies with which it is united begin to acquire a State of Dissolution; but the oily Principle of *Bath-waters* is that which is common to all Waters, and is so far from being of a volatile Nature, that it remains
in

in the Refidium of *Bath*-waters, not only after their volatile and saline Parts have been separated from them, but likewise after Evaporation of all their aqueous Humidity.

For this Reason, Dr. *Lucas*, in the second Part of his Treatise on Waters, speaking of the sulphureous or inflammable Principle, with great Perspicuity and Judgment makes the following Remark, *p.* 21.

“ That from this inflammable
 “ Principle we must carefully distin-
 “ guish an oily Matter, with which
 “ the Air abounds, and from whence
 “ Vegetables, if not Animals, borrow
 “ some Part of their Oils, Refins,
 “ and Fat. From this no Water,
 “ that is long exposed to the Action
 “ of the Air, is found free. It is
 “ confounded with the Phlogiston,

“ but most injudiciously ; for they
 “ are as different as a simple elemen-
 “ tary Matter, and a mixed or com-
 “ pound Body can be. The one is
 “ only to be demonstrated in its Ef-
 “ fects, or Unions with other Bodies:
 “ The other may by various Means
 “ be shewn in an aggregate Form.
 “ Such Waters, for Example, as con-
 “ tain the former, lose it upon being
 “ heated ; whereas the latter may be
 “ found with the Residuum, after
 “ Evaporation of the aqueous Hu-
 “ midity.

“ The Waters most strongly
 “ charged with this oily Matter, are
 “ most apt to ferment and putrify.
 “ Before one of these Operations, or
 “ Evaporation, the Senses cannot
 “ discover this Matter in any Water.
 “ But in the first it gives an inflam-
 “ mable

“ mable Spirit, in the second a vola-
 “ tile acrid one, with Phlogiston, the
 “ original Composition being dis-
 “ solved in Fermentation, and a new
 “ Combination produced ; while in
 “ Putrefaction it is broken and sepa-
 “ rated into its first Principles, the
 “ last Evaporation yielding the intire
 “ Aggregate.

“ In all putrid Waters, the volatile
 “ phlogistic Principle strikes the Nose
 “ strongest ; and the Stench pro-
 “ duced being likest that of a Solu-
 “ tion of Sulphur with Alkalies, pre-
 “ cipitated by Acids, has universally
 “ obtained the Name of Sulphur,
 “ tho’ it evidently wants the princi-
 “ pal Part ; the Basis of that mixed
 “ Body called Sulphur, and conse-
 “ quently every other Characteristic
 “ of that Mineral.”

From this Quotation therefore it is evident, that the oily Matter of *Bath-waters* is not Phlogiston, but the oily Matter common to all Waters ; but the Utility of this Article, as an Ingredient in the Composition of Waters, hath not yet been demonstrated experimentally: And indeed, as it is found in all Waters, it seems to be derived to them accidentally from the Earth, or the Atmosphere ; perhaps from both. Those who have most considered it are of Opinion, that it makes both Water and Vegetables nutritious to Animals.

CHAPTER THE SEVENTH.

*Of the Qualities of pure Water
in the Cure of Diseases, and of
the Efficacy Bath Waters owe
thereto.*

HAVING now animadverted on the volatile and fixed Substances obtained from *Bath-waters*, and shewn their Qualities, Natures, and Uses, as by means of their Solution in pure Water, it is, that they become capable, with their united Force, of entering into our sanguiferous and lymphatic Vessels, and of blending themselves with our Humours; it leads me, in the next place, to explaine the Virtues of pure ele-

mentary Water: For when the Waters of *Bath* are freed from their volatile and fixed, saline, oily and terrene Parts, the remaining Humidity will be nothing more than a pure Water, of no other Efficacy or Quality than the simple purified Water from any other Spring.

It is a Subject indeed, with the Use of which, all Ages have been acquainted, and it has employed the Thoughts of so many ingenious Writers in the Course of Time, that it can scarce now admit of any further Illustration. I shall therefore, without making any Apology for it, endeavour to give my Readers a View of it's Powers and Virtues on animal Bodies, from a Collection of Remarks, that have been made there-
 2 on,

on, which will I hope be demonstrative of the great Utility of pure Water in preserving Health, and in preventing and curing both acute and chronic Diseases ; as likewise, how greatly the medicinal Springs in *Bath* are indebted to the Powers of that Element, for their Efficacy.

If there is in Nature, says the learned *Hoffman*, a Medicine that deserves the Name of universal, it is in my Opinion common Water, the Use of which is not only so general, but necessary to us all, that without it, we can neither live, nor preserve our Bodies in perfect Health ; for it not only protects and defends the Body from various Kinds of Corruption and Distempers, but so answers every Intention of Cure in Diseases,

that

that without it scarce any one Disorder, acute or chronic, can be happily and successfully removed.

The Circulation of our Humours, through the animal Machine, is carried on by a great Variety of Organs and Ducts. The elastic Fibres of the Muscles, which are furnished with a successive and reciprocal Dilatation and Contraction, constitute the Organs. These Organs are Vessels, some of larger, and others of lesser Diameters. When then at any Time the Elasticity and Impulse of the Fibres are so diminished, as not to bear a due Proportion to the Quantity of the Humours to be moved, and when these Humours are not quickly and expeditiously propelled, Stagnations of the Humours must unavoidably happen in the capillary Vessels,

Vessels, and produce Putrefactions, the most fruitful Source of Disorders and Death.

Could the same State of Body, the same Mobility of the Fibres and Vessels, and the same Degree of Aperture in the Pores and minute Passages, be continually preserved, it is indubitable, that Life might, and would of Course be protracted, until external Causes and foreign Degrees of Violence interfered and brought it to final Dissolution.

How evident therefore is it, that pure and light Water must be agreeable to the different Natures and Constitutions of all Men, since the Circulation of the Fluids, through the Canals and finest Vessels, is what preserves and secures the Body from Corruption, and keeps the Blood
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and Juices in a thin and movable State?

Nay, the same learned Gentleman further says, that nothing is more wholesome, nothing better fitted, or more necessary to preserve Life, than Water, which is so agreeable to the Nature of the human Body, that without it, Life cannot be long preserved, or Health subsist; for, if we strictly enquire into the Causes of Health, we shall find it to be an equable and free Circulation of the Juices through all the Canals of the Body, even the finest, that lead to the excretory Ducts; for by Means thereof it is, that what proves serviceable and fit for Nutrition, is separated for Use by the proper Strainers, and what would either prove
 useless,

useless, corruptible, or inconvenient to the Body, is discharged.

Health, therefore, can never be maintained, unless a due Fluidity in the Blood, as well as a proper Degree of Elasticity in the Solids, be preserved; for thereby it is, that Nature promotes the Excretion of unnecessary Substances, affords a convenient Nutriment to the solid Parts, and procures to the Nerves and Fibres that most subtil Fluid, by Means whereof they feel and move.

Wherefore, whenever this free and equable Motion is obstructed, either by an Overcharge of Humours, their Viscidity, or by Weakness of the Spring or Tension of the moving Fibres, it becomes an immediate Cause of Diseases, especially those we term chronical; for from these Causes
will

will most certainly proceed Stagnations of the Juices, in the smaller and larger Vessels, Obstructions in their excretory Ducts, and Indurations in the glandular Parts, which are soon followed with great Impurities of the Humours, productive of Pains and Spasms, and, in Process of Time, they acquire a putrid State, which is the very Bane of Health, and the direct Opposite to Life.

From a due Deliberation on all which it is manifest, that a proper Fluidity of the Blood is most absolutely necessary, not only to prevent Diseases, but to continue Life; for thereby only is the Circulation kept up, Obstructions prevented, Excretions secured, Stagnations and Impurities of the Juices hindered, and the Causes of Diseases cut off.

And

And whether Nature has in it a better disposed Remedy, for procuring this necessary State of the Blood, than pure Water, may not only be left to the Decision of every rational and experienced Physician, but likewise to the daily Observation and common Sense of every Individual; for nothing can be more manifest, than that a pure and subtil Water most exquisitely divides the solid and viscid Parts of our Blood and Juices, so as to prevent their coagulating or coming together, at the same time that it dissolves the useless and recrementitious Matter of various Kinds, whether it be earthy, saline, or unctuous, and discharges the same by the proper Outlets. Thus much may, with Truth, be said of Water, mixed with our Blood, as a
Pre-

Preservative of Health, and a curative Medicine in chronical Distempers. But these are not all it's Virtues; for certain it is, that Water is a most appropriated Menstruum to dissolve our Aliment, extract it's Chyle or nutritional Part, and carry the same to all Parts, thro' the innermost and finest of our Canals, whereby the Body has its daily Decrease restored, and at the same time that tough, viscus Slime, which lines the glandular Coats of the Stomach and Duodenum, washed off; by means whereof the dissolving Juices of the Intestines, which are the immediate Instruments of Digestion, are enabled more plentifully to mix with our Food, and perform their Office. Whence Water may, with great Propriety, be called the grand Agent of the Office
of

of Digestion ; for, without it's Assistance, in that necessary and great Work of the Animal Oeconomy, Nature must soon desist from all Endeavours to perform it.

In the Cure of acute Diseases, amongst which Fevers first present themselves, Experience proves, that if Water be not the only proper Instrument in their Cure ; there is no better Remedy yet discovered in certain Species of them, than a free and copious Use of this Fluid ; for by this alone, with the Assistance of Rest and temperate Warmth, the most violent Fevers have been cured, without other Medicines : In such Cases, cooling, moistening, and perspirative Remedies, being the principal Requisites ; and all these Qualities are found in pure Water, as the
I learned

learned *Lommius*, in his ingenious Treatise of Fevers, has particularly remarked.

So likewise the several chronical Distempers to which we are subject, having Obstructions of the Viscera or glandular Parts for their Origin, or a Surcharge and Foulness of the Juices, with a retarded Motion in the larger Vessels, (which, by the best Rules of Theory and Practice, must be altered before a Cure can be compleated) are not more affected by any other Remedy in Nature, than by pure and simple Water. Nay, the many medicinal Springs, both of the hot and cold Kind, which have proved so eminently serviceable in the Cure of those Disorders, owe the greatest Part of their Efficacy to their pure elementary
Water ;

Water; for it is reasonable to conjecture, that the mineral volatile Spirit and Salt, which is contained in the Quantity of the Waters that are drank by any Individual, would prove very insignificant, were they to be exhibited without their purely aqueous Part.

And, in the Records of physical History, there are numerous Instances of pure and light Water to be found, which, without containing any discoverable mineral Ingredients, have proved of extraordinary Power in the Cure of chronical Distempers, amongst which, in Ulcers, Scrophulas, and leprous Disorders, none are more deserving of publick Notice, than the Waters which flow from the noted Springs at *Malvern* in *Worcestershire*, where the worthy Bishop

of the Diocefs, and many others of the principal Gentlemen of the County, warmed with a benevolent Zeal to be instrumental in removing the Miferies of their Fellow-creatures, have united their Endeavours, to render the Place commodious for the Reception of the Afflicted, that the Virtues of thofe Waters which are truly aftonifhing, and can fcarcely be afcribed to any Thing elfe but the Purity of the Water, (as appears from the Examination into it's Parts, and from the Cures it has performed, which have been publifhed by my much valued Friend, the ingenious Dr. *Wall*,) may be more univerfally experienced and felt, than it is poffible they fhould be, without neceffary and proper Accommodations. If therefore pure Water can alone be

capable

capable of such great and astonishing Effects, how much more may we expect from it, when it is moderately or in due Quantity charged with other penetrating and powerful Ingredients, as we find it is, in the deservedly celebrated Fountains at *Bath*?

CHAPTER THE EIGHTH.

Of the Alteration which the Nature and Qualities of the several Ingredients in Bath-water are liable to, by their Union together; with some Remarks on the Hospital in Bath.

DAILY Observation has furnished us with an Infinity of Proofs, that different Bodies by Mixture become so totally changed, as in no Respect to continue the same Things they were before their Union. We see they lose the Properties they had while they were in a separate State, and acquire new ones of a very contrary Nature to what either of them had before they were united; and these Properties, which Bodies
lose

lose or acquire by Mixture, are not to be discovered by any particular Appearance the united Bodies put on, but must remain entirely undiscovered, till it's Effects are brought to light by Experiments and Observation. Hence, though the several Ingredients in *Bath-water* possess the respective Qualities which have been ascribed to each of them, separately considered; it will not follow, that they should remain the same in the Waters, when they are dissolved and perfectly blended together at the Fountain-Head. Wherefore, such Truths as Observations upon chemical Experiments have investigated, relative to the Union of these Articles, should be deliberately considered; because, thereby we may in some Degree be enabled, at least to judge ra-

tionally what Advantage or Disadvantage the Ingredients of the Water may acquire or sustain by their Combination with each other, as thereby their Nature and Effects may be materially altered. For amongst Bodies which are changed by Mixture, none are more materially so than the various Tribe of Salts, which when united have not only Properties, neither of them had before ; but likewise lose many of those which they were separately possessed of. Nay, the Effects of a Mixture of any two different Salts, in different Proportions, will be altered, according as the Proportions of the one to the other is varied ; and it should always be remembered, that what Way soever Salts are united with Salts of an opposite Nature, new saline Productions

ductions will arise; the peculiar Properties and Powers of each of which are not to be found out, without a great Variety of Experiments.

Whence it must be manifest, that, without Knowledge in Chemistry, no one can, with Judgment and Propriety, administer any Waters, or other Medicine, the Efficacy whereof depends upon a Combination of Salts; unless by a great Variety of truly stated Instances of it's Powers on the Body, he is clearly convinced what it can and what it cannot do, and in what Manner it ought to be administered, in order to produce in this or that Constitution or Disease, this or that Effect.

As therefore the Efficacy of *Bath-*waters in a great measure depends on their saline Parts, and as Chemistry
alone

alone cannot prove to us what Effects it's Salts will certainly produce on Animal Bodies ; it must be astonishing to every thinking Man to find, that there should at this time be wanting a Collection of historical Facts, wherein *Bath* Water has been depended upon for the Cure of Distempers, from which something certain might be learned of their Virtues and Effects. Especially if we consider how great the Concourse of Invalids has been to the *Bath* for the Establishment of their Healths; how distinguished that City has of late Years appeared, for the Number and Genius of it's medical Practitioners, and the great Opportunity the General Hospital affords towards compiling such a Work, into which no Patient is received, without bringing with him a State of
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his Case to the Time of his Admission; it is, I say, astonishing, when we consider these Things, to see that a Work so extremely useful in itself, for compiling which Materials are so plenty, and the doing whereof from the Hospital would be so easy, should at this time be wanting.

This is the only Work that can prove an unerring Guide, to direct the Practitioner in a proper Method of administering the Waters; and this, so soon as ever I am furnished with sufficient Materials, I will faithfully publish to the World; unless roused by a just Sense of their long neglected Duty, it should be rendered unnecessary for me to do it, by the Physicians to the General Hospital at *Bath*, commonly called the *Bath Infirmary*. These Gentlemen, as if they

they alone were the only Persons to be consulted by the Sick who resort to *Bath*, have hitherto not only shamefully neglected the Communication of the good and bad Effects of *Bath Waters* on the Patients therein, but have most artfully monopolized all Opportunities of Improvement, from the great Experience which that charitable Institution affords.

This has been effected by virtue of a private Order, or pretended Bye-Law, wherein the Physicians and Surgeons attending the said Hospital, are reduced from the Number of Six to Three only ; tho', by the Act for establishing the said Hospital, it is enacted, " That the several Persons
 " to be employed as Physicians and
 " Surgeons thereto, shall be, from
 " time

“ time to time, appointed and chosen
 “ into such their respective Employ-
 “ ments by the President and Go-
 “ vernors of the said Hospital, or
 “ the major Part of them, in a ge-
 “ neral Court or Assembly; and at
 “ their Will and Pleasure be re-
 “ moved from their Stations and
 “ Employments, *and other fit and*
 “ *able Persons thereunto appointed in*
 “ *their room.* And likewise, that if
 “ there be any Vacancy, or Vacan-
 “ cies, of any of the said Person or
 “ Persons appointed by this Act, or
 “ chosen at a general Court as afore-
 “ said, happening by Death or Re-
 “ moval, *such Vacancy or Vacancies*
 “ *shall be filled up* at a general Court
 “ or Assembly, to be held of the
 “ said President and Governors, after
 “ four-

“ fourteen Days Notice at least, to
 “ be given thereof.”

How repugnant, therefore, is this private Order to the express Words of the Statute, for establishing the said Hospital? And how different to the rest of the Proceedings of the Governors thereof, whose prudent Conduct, in the Management of the Fund for supporting the same, is truly exemplary, and cannot be too greatly applauded!

But an Order for reducing the Number of Physicians, and thereby lessening the Assistance which might be given to the afflicted Poor, when the same is not attended with the least Expence to the Charity, must be made with an Intent to answer a private, and not a publick Purpose, and

be universally allowed deserving of the severest Censure, instead of the Approbation and Sanction of the Bishop of *Bath* and *Wells*, and the Justices of Assize for the County of *Somerset*, which, by Act of Parliament for establishing the said Hospital, are required to be had for the Confirmation of every Bye-Law relative to the same, tho' it has never been obtained, or requested, for the Ratification of any one of them; and tho' without it, not a single Law, Order, or Rule can have the least Force or Validity.

With due Deference, therefore, to those honourable Personages, and the rest of the worthy Gentlemen who are incorporated by the Name of the President and Governors of the *Bath* Infirmary, it may be questioned, if
it

it be not their Duty to see, that the Laws, Orders, and Resolutions, for the Government of the said Hospital, be confirmed as by the Act of Parliament is directed ; since, for Want thereof, it may reasonably be thought, the exclusive Order beforementioned has been established, though detrimental to the publick Interest of the Hospital, injurious to the Patients therein, and repugnant to the very Statute under which the Power is claimed for making Bye-Laws, and which, in exprefs Words, directs every Bye-Law that shall be made, to be consonant to Reason and the Laws of the Land.

What therefore can be more so, than that this Restriction should be immediately removed, and that the Gates of the Hospital should be open-
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ed to the several Gentlemen of the Faculty resident in *Bath*, who are disposed to attend the same, that the wretched Poor, who are sent thither for Relief, may no longer be deprived of the Benefit they might receive from the Knowledge and Skill of the other Physicians, as well as those who are now permitted to attend the Charity; for I hope, without Offence to either of the learned Gentlemen, it may with Truth be said, that there are others in *Bath* who are acquainted with Hospital Practice, with Chemistry, Pharmacy, and Anatomy, as well as themselves; and that the whole Knowledge of Physick has never yet been limited to the Heads of any three Individuals. Why, then, the Patients of this Hospital should be prohibited the Advantage,

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which

which the rest of the Faculty may afford them, is to me inconceivable.

And tho' it may be true, as by some it is urged, that the Business of the Hospital may not be too much for the Care of the present Number of Physicians; it may be reasonably asked, why, when the Expences of the Hospital were found too great for it's Income, and it was resolved that the Number of Patients should be reduced, and limited to Forty only; the Physicians should, the same Day, be increased in Number from Three to Six? And now, when the Sick are received to the Number of 120, the Physicians should be again reduced from Six to Three; since by this Means one grand End, for which the Charity was established, must in a great measure

sure be defeated? These Proceedings appear the more extraordinary, as it was urged, as a Motive to Subscribers to contribute towards the Foundation of the Charity, that not only the Poor, who were sent to the Hospital, would be benefited thereby, but even the Contributors themselves, in some degree, recompensed by the Augmentation of Skill, which the Physicians must acquire from their Practice therein, so as to render them more capable of administering the Waters, to relieve the Calamities of the Rich. But it is impossible this great and good Purpose should be obtained from the Charity, while the present exclusive Order of the Faculty subsists, and while the Physicians to the Hospital, for want of Time, or from any other Want or

Motive, neglect to publish to the World the Histories of the Cases received therein. This Counter-acting of the wise and benevolent Purposes of this excellent Institution, is a Proceeding unwarranted by the Laws of Charity, and can arise only from a mercenary Meanness of Spirit, or a worse Principle: For to do Good and to communicate, is the Command of him, to whom we should be all Obedience: And how consistent this Practice is with that great Command, needs no Hesitation to determine. In short, it is an enormous Abuse of a most noble Charity, and loudly calls upon it's Directors for a speedy Reformation.

But, as the Waters, and not the Hospital, were the designed Subject of this Tract, it is time to return from
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so ungrateful, tho' necessary a Digression, and to consider what Advantage or Disadvantage to the Qualities and Virtues of the Water must accrue from the Mixture of it's several Ingredients: For, by this Means only, until we have a Number of truly stated Facts to guide our Practice, we may, with a Plausibility of Reasoning, be enabled to justify our Conduct in the Administration of them to our Patients, and keep free from the present too just Imputation of acting empirically.

First, then, the chalybeate Principle these Waters afford, was it not dissolved by means of an Acid, would be too gross to enter into the Course of Circulation, or to produce it's Effects on the Blood; unless by meeting with an accidental Acid in it's Passage

through the Stomach, it should thereby be dissolved; and in that State, with the Chile, be absorbed by the Lacteals, and blended with the Animal Fluids: It is, therefore, by means of it's Union with the volatile Acid, that it is divided and equally diffused through the whole Quantity of the Waters, and enabled to pass with them through every Canal in the Body, and thereby to brace up the Fibres of our minutest Vessels; whose Action, when lost or impaired, can probably, in many Cases, be restored only by a Medicine endued with that particular Degree of tonic Power, which the Waters of *Bath* possess from their volatile vitriolic Principle.

Indeed we know that Mercury and other Minerals, united with different Acids, do produce different Effects,

fects, notwithstanding some of their Effects are produceable by every Mixture made with them. And we see some Medicines extremely serviceable in very small Doses, which are found very prejudicial in large. Until, therefore, we are better acquainted, than we are at present, with the Nature and Virtues of this volatile Acid, it will not be easy to demonstrate, that because this Iron, with which it is evidently united, is in so small a Quantity in the Waters, it's Effects will be proportionably inconsiderable; for it is not clear, but that this small Quantity of Steel, which the Acid has taken up, may be the only operative medicinal Part of a much larger Quantity; since, as has been already observed, the operative Part of many

Medicines is extremely minute. Why therefore the Acid of these Waters, in Conjunction with it's Steel, should not be looked upon as a natural Preparation of Steel, having some Properties peculiar to itself, as well as the Properties of Chalybeats in general, I do not see ; but certain it is, that, by Means of this subtil volatile Acid, the Metal is perfectly miscible with the Water, and rendered capable of producing it's Effects in the Cure of Diseases.

Indeed, to the Power of this Acid it is, that the Waters owe, not only their vitriolic Spirit, but their Salts likewise ; on which, together with their elementary Water, every Virtue of these Fountains must depend. For, by Experiments it is evident, that this Acid, though a volatile one, has

has the Property of all Acids, the Faculty of effervescing with Alkalies, of changing Colours, of corroding Metals, of astringing the Vessels, of thickening the animal Fluids, and every other Criterion by which Acids are distinguished ; and the Earth, which these Waters afford, like all other calcareous Earths, is found to be of a fixed Nature, indissolvable in Water, absorbent, and capable of inducing the same Alterations in Colours, as Alkalies, to cause Ebullitions with Acids, and obtund their Acidity, and to produce most other Effects, which are observed to succeed with Alkalies ; from whence, on a superficial View, we might be led to believe, that, as the Waters are found to contain these two Principles, they would consequently be possessed with
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their different Qualities, did not Experiment convince us to the contrary, and prove, that, immediately on the Contact of this Acid with the Earth, a violent Conflict will ensue, and continue until they are so proportioned one to the other, that no further Ebullition will arise on the Addition of either. At which Time, both the Earth and the Acid will be deprived of every Power they were before possessed of, and a new Body constituted, which is a Kind of neutral Salt, dissolvable in Water, and capable of producing certain Effects as a Medicine, which neither of the Principles of which it was composed were capable of producing in their separate State; the general Nature and Properties of which Kind of Salt has before been described, when
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the first Salt of these Waters and it's Vitues was considered.

And it is well known, that by chemical Distillation, every different neutral Salt will afford an acid Spirit, which, by being united with other Acids, may probably be capable of producing very singular and uncommon Effects, especially with the Acid of Sea-salt, which every one, the least versed in Chemistry, knows, by its Union with the Acid of Nitre, will constitute an *Aqua Regia*, or a liquid Solvent for Gold ; although neither the Acid of the Nitre, or of the Sea-salt alone, was capable of touching it. With how much Reason, therefore, may we conjecture, that as the Sea-salt is found in large Quantities in *Bath*-waters, and the Effects of the Acid obtainable from the neutral
Salt

Salt of the Water, is not yet demonstrated, that the Acid of these two Salts, being united in the Waters, is one great Cause of their surprizing Virtues, and that to this particular Union of the Salts, or their Acids together, it is, that they have Power to penetrate, divide, and attenuate obstructing Matter in our Vessels, arising from particular Defects in our Humours, which, perhaps, no other Salt in Nature, nor either of these in a separate State or in different Proportions, could possibly do.

In Cases, therefore, where *Bath-*waters are a Medicine in Point, with what Face of Honesty, a Practitioner can substitute other Salts, in the room of those procurable from the Waters, so long as the particular Virtues and Qualities of the Salts

therein are not perfectly known from historical Facts, may be submitted to the Opinion of every considerate Person ; as may likewise those material Questions, Whether the Waters are not an effectual Remedy at a Distance from the Spring, in certain Cases, as well as at their Sources, as they do not lose their saline Principles by Carriage or Keeping ? And whether, if small Doses of these Salts were to be administered in proper Quantities of warm Water, they would not be of great Utility, in the Cure of those particular chronic Disorders, in which *Bath* Waters are found to be effectual ? as well as a Means, in many Cases, of making the *Bath* Waters themselves more effectual at their Sources, when they are found in their natural State to be too

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heating, or otherwise disagreeable or ineffectual to the Patients?

But was the volatile Acid, the chalybeate Principle of the Waters with which it is united, and the Earth, or earthy Bodies it dissolves in the Formation of it's Salts, to be separately used, either externally or internally, without being blended together, and perfectly dissolved in the watery Fluid, it is highly probable, that they would, by their Pungency, irritate the Nerves of the Palate, Stomach, and Intestines so much, as to throw them into involuntary Contractions, and thereby close and shut up the Ducts of the Vasa Inhalantia, precluding thus their own Entrance, and preventing their good Effects in removing Obstructions. Whereas, when the Particles of these several Ingredients

dients are separated from each other, by the Interposition of a due Quantity of pure Water, in which State they are poured forth by Nature from the Bowels of the Earth, they are rendered so extremely mild, as to produce rather an agreeable than a painful Stimulus; and from the Warmth with which they are possessed, instead of exciting any Contraction of the Entrances into these Ducts, they relax them, and are thereby absorbed, and carried through the smallest Vessels of the Animal Body, where they not only alter and wash away the Acrimony and Viscosity of the Humours, the Origin of almost every Disease; but likewise, by means of their volatile Acid united with Iron, leave the Animal Fibres strengthened, in the same manner as

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Rhubarb does the Intestines, when it ceases to operate as a Purgative.

Surely, therefore, these Considerations on the natural Waters are sufficiently convincing, that not only their peculiar Efficacy depends on their being so particularly constituted, as by Nature they are, and that tho' Art may enable the experienced Chemist to discover something of her Works, and, in some Cases, how to render them more useful, yet the most judicious must confess, there are many Preparations of her's that are beyond the Reach of their Knowledge: From whence we should learn this Maxim in Physick, That where any simple Medicine, in it's natural State, will agree with the Sick, it will generally be more safe or certain, if not both, in producing it's Ef-

Effects, than it will be when it has undergone any Change in it's Texture, by the Contrivance of Art. As, to name no other Instance, is evident from the daily good Effects which are wrought by the *Peruvian* Bark in Substance, in Cases where the several Preparations of it prove ineffectual.

CHAPTER THE NINTH.

*Of the general Qualities of Bath
Water.*

HAVING now shewn not only the Qualities and Virtues generally ascribed to every known Principle in the Composition of these Waters, and considered the Alterations, they severally undergo by their Union; many of my Readers may expect I should here recite how and in what manner the Waters should be administered, in the Cure of the several Diseases, wherein either Reason or Experience directs their Use.

But to do this, in a Manner clearly intelligible to Persons unqualified for the Practice of Physick, is a Subject sufficient for many Volumes,

lumes, and would require a plain and distinct Rationale of each Disease, as well as an Account how and by what mechanical Means a Mixture of the Waters with the Blood, by acting on the Solids and Fluids of the Body, might perform the Cure.

Therefore, as the Design of these Sheets is principally to illustrate the Excellencies of *Bath Waters*, to stop an inconsiderate, and to introduce a rational, instead of an empirical Practice; I shall by no means attempt to enable Persons, not conversant with the Rules of Physick, to direct their Use; lest, by their Misapplication, both the Constitutions of the Sick, and the Credit of the Waters, should be injured; for nothing is more certain, than that to apply Medicines skillfully in any Disorder, requires a

general Knowledge in the Science of Physick, and a due Consideration of an Infinity of Circumstances, beyond the Conceptions of those who are intirely unacquainted with the healing Art.

There is no Disease which is at all times to be treated alike, or in which the same Medicine might not at one time do Service, and at another prove injurious. Nay, we know that the same Medicine, in different Doses, and under different Regimens, will always produce different Effects.

For Instance, a small Dose of Jalap, antimonial Wine, and many other stimulating Evacuants, will be overcome by the Powers of the Stomach; and, when digested, be carried into the Course of Circulation, and there irritate the Fibres of the
Vessels

Vessels, so as to quicken the Motion of the Fluids, and cause a Discharge from them at their excretory Ducts, by an increased Perspiration: Whereas, in a somewhat larger Dose, they will act on the Glands of the Intestines, and prove purgative; and, by being given in an increased Quantity, will overpower the Strength of the Stomach, and act as powerful Emetics. Nay, pure cold Water, drank freely and expeditiously, while the Body is gently moved in the open Air, will dilute the Feces, and prove eccoprotic or diuretic; whereas, if it be drank so, when the Body is kept warm in Bed, it will be determined to the Skin, and excite a Sweat.

Can any one reflect on these Observations, all which are manifest Truths, and not esteem it an Act of

the highest Imprudence, to give particular Directions, in a Treatise of this Sort, to People not versed in the Science of Physick, whereby they may take upon them the Use of the Waters, for the Application of which so general a Knowledge of Medicines and Diseases are requisite? But as every qualified Physician must be capable, from the Examination of his Patients, and from a due Consideration of their Distempers, to discover the Indications of Cure in every Disease; it will be allowed, that in a Work of this Sort, it is sufficient to say, that whatever may be expected from the Use of a very gentle, subtil, chalybeat, and saline Aperient, exhibited in a large Quantity of pure Water, rather warmer than human Blood, and capable of an intimate
Union

Union therewith, may be obtained from a prudent Use of *Bath Waters*. Or, in other Words, whatever Alterations our Bodies may undergo, from a Rarefaction, Dilution, and Attenuation of the Fluids, even in the minutest Vessels, together with an Increase of the Elasticity of their constituent Fibres, are the Effects which *Bath Waters* will always produce: For a clearer Explanation of which, and for an Introduction to the following Chapters, it is necessary to say something of the Structure of the human Body, and the Animal Oeconomy; without a Knowledge of which, we can understand little or nothing of the noble Art of Healing.

CHAPTER THE TENTH.

*Of the Structure of the human Body,
and of the animal Oeconomy.*

THE Structure of the human Body, and the Functions of it's different Parts, are highly requisite to be known before the Nature of any Disease can be intelligibly explained ; for, unless we know what a Body is in Health, it is impossible we should ascertain it's Defects, when it deviates from an healthful State. Wherefore, the most excellent of all our medical Practitioners have been expert and accurate Anatomists ; and the better versed any one is in that Branch of natural Knowledge, the more likely he will be to be successful in the Cure

of Distempers ; for which Reason, every Individual, who means to act as a Physician, must first acquire a general Knowledge of the human System, before he presumes to exercise his Profession : For, as no one, who is a Stranger to the Spring and different Wheels in a Watch, can have Genius enough to put them together in Order, or regulate their Motions ; it is impossible that he who is unacquainted with the Mechanism of the animal Body, and the Functions proper to it's different Parts, should know how to restore lost, or to regulate it's inordinate Motions ; as it is certain, that every Part of the whole complicated Machine is dependent upon another, and that, without a proper Ability in each Part, the several Functions of the whole cannot be duly performed.

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The following Remarks, therefore, are collected together, to enable such of my Readers, as have never studied this Branch of the Science, to form an Idea of the wonderful Manner in which our Bodies are constituted, and with what excellent Oeconomy wise Nature preserves the Fabrick in Order, and contributes to the Repair of it, as often as it is injured.

Anatomists have divided the animal Body into two general Parts, Solids and Fluids. The latter of which are contained in the former; and the Solids in different Parts, as the Fibres are more firmly or loosely connected, put on very different Appearances; yet in every Part, the primary Principles of which they are formed are the same; for the several
Vessels,

Vessels, Membranes, Ligaments, and Bones of the Body, being consumed by Fire, will all leave the same immutable terrene Substance. From whence it is manifest, that the solid Parts of our Bodies differ only in the firmer or looser Contexture of the smallest Corpuscles whereof they consist. It is from a Number of these smallest Particles, united together by a glewy Cement, that our Fibres are made; several of which, applied to each other, compose a simple Membrane; and of this Sort of simple Membrane, rolled up, is formed a Vessel, which is the first and smallest Canal in the animal Body; and *Lewenboeck* † has demonstrated by Calculation, that the Orifices of at least

† In his Forty third Physiological Epistle to the Royal Society.

125,000 of them may be covered under the Space of one single Grain of Sand. From these Pores, our Humours are continually exhaling, otherwise a Foundation is laid for producing a Disease. Of these smallest Vessels, differently interwoven, in either a parallel, opposite, or spiral Direction, the greater Membranes are formed; and of them the greater Vessels are made; of which, not only the Viscera, but solid Parts of the Body are composed. All these are so united together, that the Connection of every Part with the rest, either mediately or immediately, may easily be shewn*. A Vein and a Lymphatic cohere to an Artery, by means of a Gland which arises from the Artery. All the Arteries arise from the Aorta, which

* Boërhaave de Viribus Med. C. 2.

is continued in different Directions from the Heart ; the Heart communicates with the Brain, by means of the Nerves and ascending Arteries ; the Brain is contiguous to the Cerebellum ; and this, to the spinal Marrow, &c. Indeed all the various Canals of the animal Frame, one way or other, hold an Intercourse with each other. To begin at the Heart ; the whole Mass of Blood is by the Aorta carried to all the Extremities, to the minutest and remotest Recesses of the Body ; and, in it's Current, supplies the various Juices, which are, by the different Glands, separated from the general Mass of Humours, for the various Purposes of the Oeconomy. And after the Blood is thus spoiled of all the other separate Juices, whether useful, as Sperm, the Mucus
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of the Veffels, the Saliva, the gaſtric Juice, the Humours of the Eye, the Wax of the Ears, &c. or ufeleſs and excrementitious, as the Mucus of the Noſe, the Urine, tranſpirable Matter of Sanctorius, &c. it is carried back by the Ramifications of the Veins ; which, for this Purpoſe, attend upon the Arteries, till, at the great Confluence of all the Veins, they meet in the Venacava, which conveys the whole venal Blood again to the Heart, as to the common Center, whence it ſprung. And thus the Circulation of the Juices, and general Communication between the Parts of the Body, are regularly continued.

Every Canal and Receptacle of the Body contains ſome certain Liquids, if the Body is in Health ; and therefore, as the ſeveral Canals communi-

municate with each other, the Li-
 quids must also necessarily communi-
 cate; whence the Agitation, which is
 excited in one Part of the Liquids,
 may be communicated to all the rest,
 and consequently all, except such as
 are excrementitious by the Course of
 Circulation, within a certain Time
 return to the Heart, by means of
 the Motion they receive from the
 Elasticity or Spring of the Fibres,
 which constitute the several sanguife-
 rous and lymphatic Vessels. All the
 Humours or Fluids of the Body de-
 rive their Origin from the Blood;
 and the Blood on standing, after it
 is taken out of the Animal, is sepa-
 rable into three principal Parts. The
 first of which is an almost insipid
 Water, which, in it's natural State,
 has but very little Scent; but being
 exposed

exposed to the Fire, flies off in Vapour, yielding a fœtid Odour; it is called the Lymph, and in Proportion is more than one half of the whole. The second Part is what we call the Serum of the Blood; a Liquor not red in it's natural State, but transparent and yellowish; when disturbed, not easily congealable by the Power of Cold; but, by being exposed to Heat, hardens like the White of an Egg. The third is that Part which gives a Redness to the whole, and which, both by Heat and Cold, becomes a red, firm, tenacious Mass, and is called the Crassamentum, or parenchymous, fleshy or fibrous Parts of the Blood.

But if the Blood, while in a fluid State, be examined with a Microscope, we see further that it consists

sists of spherical Particles, swimming in a limpid Fluid, which, in the greater Vessels, retain their spherical Figure, and appear red, tho', towards the narrow Parts of the Vessels, they become oval, and change from a red to a yellowish Colour. It is likewise found, that every of these Globules consists of six other smaller ones, and each of these, of six others, and so on. These small Globules, being separated from each other, immediately lose their red Colour; but this Separation of them is made only in the smallest Vessels, which seem to be instituted by Nature for this Purpose, that the Lymph, the Humours of the Eyes, and the several other subtil and colourless Juices of the Body, may be strained from the coloured Parts of the Mass

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of Blood. From this heterogeneous Fluid, which we call the Blood, the several Humours of the Body are thus secreted into the several Receptacles, destined by Nature to receive them.

For the Arteries, which are all made conical, convey all the Humours from the Heart to every Point of the Body; and the Veins, which resemble Cylinders or inverted Cones, convey them back again to the Heart, through which the Fluids of the Body are in continual Motion.

In this Course of Circulation it is, that the proper Strainers separate the several Humours of the Body from the Blood, in the Sinus's, Vesiculæ, Folliculi, Glands, and other Receptacles which are destined by Nature to receive them. In these they are retained, till the common Course of

Nature determines them to their respective Uses.

As long, therefore, as these Fluids are regularly moved within their respective Canals, the Body continues in Health; but whenever this Motion is irregular, or stopped in any Part, the Body becomes diseased; and when the Motion intirely ceases in every Part, Death immediately ensues.

It is, therefore, on a due Elasticity of the Solids of the Body, and a moderate Temperature, just Consistency, and equal Distribution of it's Fluids, that Health depends. And, according to the particular Degree of Strength in the Elasticity of the Fibres, in different Constitutions, it is, that the Circulation of the Humours are carried with a stronger or weaker Impulse to the Extremi-

ties of the minute Vessels, where the Glands, &c. are situated, for the Secretion and Excretion of the several Juices; by the just and timely Disposal of which, the Health of the Animal is preserved, and Life supported.

As this heterogeneous Fluid, the Blood, consists of various Particles of Matter, of different Magnitudes and Qualities; it must be liable to undergo a great Variety of Changes, from innumerable Causes, whereby it's Aptitude for Circulation is made greater or less, and Obstructions in the Vessels brought on or removed: As often, therefore, as Stagnations arise in any of the Vessels, from any Cause whatsoever, the stagnant Juices are soon rendered unfit for Motion, and, by Continuance, acquire a preternatural Spissitude and Hardness, or
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a sharp putrid State ; and thereby, in different Parts, constitute different Diseases, but chiefly those, which are distinguished by the Name of chronical ; all of which depend upon a Restitution of their pristine Fluidity, for their Cure.

This leads me to consider the wonderful Nature and Powers of different Solvents ; as by Means of some of them, it is, that in those Diseases obstructing Matters of every Kind must be attenuated, and Health restored, which, as was before observed, is but a regular Motion of the Fluids, and a due Resistance of the Solids in every Part.

CHAPTER THE ELEVENTH.

Of Solvents in General; their Nature and Effects.

THAT the Powers of Menstruums are very different and often unforeseen, is evident to the Observer. And that the single Particles of them act like so many mechanical Instruments, by the Properties of their particular Figure, Size, Hardness, Gravity, &c. is generally believed; for each Solvent has it's Power limited to certain peculiar Substances, to the Pores whereof, the Figure and Size of it's Particles are particularly adapted; whence Naturalists have described the Conditions requisite for Solution, to be a proportional

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Magnitude between the smallest Pores of the Solvend, and the Particles of the Solvent ; for no Solution can ensue, if the Particles of the one are incapable of entering into the Pores of the other ; wherefore every Menstruum, while it acts, is necessarily divided into invisible Particles, and must therefore be fluid in the Action ; and, when the Solution is compleated, the Solvent and Solvend become one uniform Body ; which shews, there must be a mutual corresponding Power between the Matter to be dissolved and the Solvent ; whence the Action of Solution has by some been thought to be performed by Attraction, viz. When the Particles of the Body, to be dissolved, attract, and are attracted by, the Particles of the Menstruum, more strongly than these are by one another.

And as it appears, from what has before been said, that the different Humours of the Body are all separated from the Blood, by being strained thro' Vessels of different Diameters; it must of Consequence follow, that these Humours, in the several secretory Organs, must be of different Natures and Consistencies; and, that different Menstruums must of Course be requisite, to dissolve the obstructing Matter in different Parts of the Body, into the Vessels of which such Solvents must enter, before it is possible they should divide the Fluids, if they are become too thick, or alter them, when they are become acrimonious. This, indeed, the many accurate Experiments made by the ingenious M. *Du Fouart*, Surgeon of the Hospital at *Bicêtre*, in order to discover the

Solvent

Solvent of the Substance contained in certain Tumors, manifestly proves, and gives an excellent Model to guide our Enquiries in Matters of a like Nature*.

It is likewise evident, as the much greater Part of the Blood is an aqueous Fluid, that whatever is most miscible with Water, must be most likely to prove a Solvent to inspissated animal Fluids, so far as their Solution does not wholly depend on the Action of the animal Fibres. Aqueous Medicines, therefore, charged with Salts, are the most powerful Solvents in Nature: For, applied to our animal Juices, they readily unite with them, and pass through every Canal in the Body, whose Diameter is not

* Memoirs of the Academy Royal of Surgery, at Paris, Vol. I. Mem. 4.

too small to admit them; in which, by gently stimulating the elastick Fibres of which the Vessels are constituted, they excite a stronger Motion in the Fluids, and, in consequence thereof, cause an Attenuation of such as are too thick, and a more plentiful and speedy Excretion of such as are acrid.

Many glutinous, viscid, and hard Bodies, every one knows, will remain untouched by the Power of Water, which, by the Interposition of some other Body, will become perfectly soluble therein. Amongst which, various saline Bodies have astonishing Effects; for fixed and volatile Alkalies, and neutral Salts, as well as putrified Urine, Soap, Gall, Honey, Yelks of Eggs, render Oils, Refins, Balsams, and the like, miscible with Water, and by Means thereof capable of uniting with the
 Blood,

Blood, and of dissolving Viscidities in the Humours secerned from it ; tho' without some such Assistance, they could not possibly obtain Admittance into the Course of Circulation.

Metals, likewise indissoluble in Water, will dissolve in Acids ; and afterwards, when largely diluted in Water, will, so long as they continue dissolved, be miscible with our Fluids, and act very sensibly on the Solids. So likewise will many earthy Bodies, by an Union with an Acid, be dissolvable in Water, and so diluted therewith, as to escape the Cognizance of our Senses, without depriving the Liquor of a perfect Pelucidity ; whence it is manifestly unsafe to conclude, that any Liquor is free from Earth, because it appears to be perfectly transparent. And, from what has been said in the preceding

ceding Chapters, it is clear, that Earths, when they are dissolved in Acids, are converted into Salts, and saline Bodies unquestionably have a surprizing Power of penetrating other Bodies; for who does not know, that they will fix themselves into the Pores of Metals, and corrode them; that they will pervade the Pores of earthen Vessels, and, after having passed them, crystalize on their Outfides in their natural Figure?

Wherefore, as saline Substances are very various, namely, fixed Alkalies, amongst which may be reckoned the Nitre of the Antients, volatile Alkalies, native and fermented vegetable Acids, vegetable Acids procured from Burning, and from Distillation; native fossil Acids, fossil Acids procured by Burning, and by Distillation; neutral Salts, Nitre, Borax, fossil Salt,

Salt, Sal Gem, Sea-salt, Sal Ammoniac, as well as various other Salts, composed with some of these simple ones, each of which are made up of different Principles; the Powers whereof, separately, may be known; but which, when united, are found to have certain peculiar Properties, which their component Parts had not, and which Experiment only can demonstrate: It must be a Matter of great Consequence, that Physicians should deliberately consider the Nature of their various Combinations; for different Mixtures of Salts will always produce different saline Menstruums, of some singular dissolving Property; whether the Combination be the Contrivance of Art, or the Production of Nature or Accident. And from hence it is, that the vast Stock of Sol-

Solvents, with which Chemistry abounds, has it's Origin; by means of which, that Art may be perpetually improved, and new Phænomena produced, not only affording Pleasure and Entertainment to inquiring Minds, but at the same time leading to great and unexpected Discoveries, for the Accommodation and Preservation of Health and Life. But, as was before observed, Solution depends upon mechanical Action, and the Power of that Action on the particular Figure of the Particles of the Solvent, being adapted to the Pores of the Solvend; which Observation, of an efficacious Fitness for Action being in Bodies, from their Figure only, the learned *Boyle* illustrates by the Example of a Lock and it's Key.

Indeed

Indeed, that Bodies acquire their Powers from their Figure only, is likewise evident from the Sounds produced by a Bell, on being struck with it's Clapper, which, from it's circular Sections, changed into innumerable Ellipses, with a quick reciprocal Action, cause Undulations in the Air to a great Distance, propagating tremulous Motions and Sound ; which Effect must arise from the bare Configuration of the Bell, as it is certain, that the Matter of which the Bell is formed, in any other Figure, could not produce any such Effect. Surely then, if the Figure of a Body alone can enable it so to act on the subtil Fluid of the Atmosphere, it cannot be doubted, but it must enable it to produce more sensible Effects on the Nature of Bodies, which
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are more grossly corporeal than themselves.

And as, in the Action of Solution, the Particles of the Solvend attract and are attracted by those of the Solvent, and afterward remain united together, thereby constituting Corpuscles of a different Figure; it is not improbable, but that, by their Change in Union, they may become Menstruums for other Bodies, which neither of them would touch before they had acquired this new Figure, in consequence of their Union. Indeed, Experience proves it to be so, in the Union of the Spirit of Sea-salt with that of Nitre, affording a Solvent for Gold, which neither the one nor the other, before they were united, could at all effect.

That

That the Power of different Menstruums in dissolving Bodies, cannot be discovered but by Experiment, appears not only from what has preceded, but from the following Remarks; for altho' we have learned that *Aqua Fortis*, or Spirit of Nitre, and Oil of Vitriol, will dissolve Variety of Substances; yet they will not operate on Wax or Sulphur, both of which will easily dissolve in the animal Body; whence it is clear, it follows not from the Corrosiveness of any Menstruum, and it's being capable of dissolving hard Bodies, that it should have similar Effects upon soft; for certain Menstruums dissolve Bodies, which by no means seemed suited thereto.

The viscid, tenacious Substance of Turpentine is so penetrating, as very

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soon to give a Smell and Colour to our Urine, and to heat the Body. It also dissolves Oils and Refins, and, with a gentle Heat, in part, Gummi-refins. And tho' the Yelk of an Egg would scarce be suspected of any dissolvent Power from it's obvious Properties; yet it divides Oils, Refins, and Balsams, better than any other Substance known; destroys their Tenacity, and renders them miscible with Water, fit to unite themselves with the Humours, and to pass with them through the whole Circulation. Nay, the White of an Egg, even when it is boiled hard, will dissolve Myrrh, in a manner not to be done by any other known Assistant. We see Acids will not touch Sulphur, nor Spirit of Nitre, Gold; and tho' fixed Alka-

Alkalies will affect numerous Bodies, we find they will not touch Mercury, Silver, and many other metallick Substances: Whence we can never be certain, *a priori*, that when Acidity, Acrimony, or other saline Property, is discovered in any Menstruum, it will, in consequence thereof, dissolve any given Substance. Nor can we say Acids, Alkalies, Salts, Oils, or Water, are universal Solvents, but only in respect of those determinate Subjects, whereto Nature has fitted and limited them. And we are not to conclude, that because a Medicine is mild and inoffensive to the human Body, it will not dissolve other Bodies; for Olive-oil, tho' it may be safely applied to the Stomach in any Quantity, will dissolve Sulphur and Wax,

which it was not in the Power of *Aqua Fortis* to touch: How evident therefore is it, that we may reasonably hope for the Discovery of an effectual and speedy Solvent for the Stone in the Bladder? since it is by no means a Consequence, that the Bladder should be corroded by the same Remedy that dissolves the Stone, any more than that the Stomach should be injured by the Oil which dissolves both Wax and Brimstone; nor can we absolutely pronounce whether Menstruums should be weak or strong to dissolve any Substance, till the Matter has been determined by Experiment.

But, certain it is, the Power and Activity of most Menstruums are liable to be increased or diminished by a Number of accidental or additional

tional Causes; amongst which are particularly both Heat and Cold; for that Heat certainly excites and increases the Action of Menstruums is evident, by Solutions being made much slower, and with greater Difficulty, in cold than they are in warm Weather. But, to make perfect and compleat Solutions, some require a strong, and other a smaller Degree of Heat; nay, many act by a smaller Degree of Heat, which, by a stronger, lose their dissolving Power, and become Coagulators, instead of Solvents.

The Heat of Water confined, may, in our Climate, be increased by boiling from 32 Degrees to 212; but as it heats the more by a greater Weight of the Atmosphere, it's Heat may be prodigiously increased in the Bowels of the Earth, so as, at a greater Depth, to have perhaps an higher

dissolving Power, on many Substances, than any known Menstruum. Indeed, the celebrated Vessel called *Papin's Digestor*, is a full Demonstration of the Fact; for if any Quantity of Flesh be put therein, together with so much Water as serves sufficiently to cover it, and the Lid screwed close on, so as to admit of no Passage to the Air; by the Application of so gentle a Heat as is afforded by the Flame of a Lamp, the Subject, in a few Minutes Time, will be reduced into a fluid State; and by an Augmentation of that Heat, or the Continuance of the same but a few Minutes longer, the hardest Bones may be dissolved.

This astonishing Effect is accounted for only from the strict Closure of the Engine, which preventing the Escape of the included Air, makes the
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ſucceſſive Impreſſions, occaſioned by the Expanſion and Oſcillations of it upon the Fleſh, to be equable and ſtrong, and ſo reſolves the whole into one ſeemingly homogeneous Body, and mixes the aqueous, ſaline, oleous, and other Particles ſo ſtrongly together, as ſcarce to be ſeparable; but, while hot, to appear a Liquor, and, when cold, a Jelly, of a Strength proportionate to the Quantity of Fleſh or Bones diſſolved in the Water.

And, from a due Conſideration of this known Truth, it is not irrational to conjecture, that the medicinal Springs at *Bath*, by a like Means, are more perfectly impregnated with their mineral Principles, than it is poſſible any Water ſhould be, by the Aſſiſtance of Art, in our Atmoſphere.

Where Water is the Menstruum, it is certain, that it's dissolving Power increases and diminishes with the Degrees of Heat.

For Example: Water, 33 Degrees hot, will dissolve a certain Proportion of Sea-salt, which will prevent the Water from turning to Ice, with the same Degree of Cold that would freeze pure cold Water; but when the Cold is increased far above the Degree which freezes pure Water, then the Salt-water begins to contract, and the Salt to collect at the Bottom in little Crystals; and as the Cold gradually increases, the Water gradually deposits more Salt; till at length the Water, nearly deprived of all it's Salts, turns to Ice. On the other hand, if Water, 33 Degrees hot, has dissolved as much Salt as it could

could in that Degree of Heat, and this be afterward gradually augmented even to boiling; as the Heat increases, more and more Salt will be dissolved till the Liquor boils; but after that, no more Salt will be dissolved, though boiled ever so long.

The Water being in the former Experiment more and more purified from it's Salts, in Proportion to the Increase of Cold, as it is more and more impregnated with them, in the latter Experiment, by the Increase of Heat.

How manifest, therefore, is it, that the Knowledge of these Things should be acquired, by every one who takes upon him to remove obstructing Matter in the Vessels of any Part of the Body.

It

It is, indeed, a Matter of the utmost Consequence to the Publick, that we should be convinced by Experiment and Observation, from which alone it can be learned, how far *Bath Waters* are capable of attenuating, dividing, and rendering fluid stagnant Matter in animal Bodies, which is the most common Cause of, and constant Attendant upon, chronical Distempers.

Or how far it is, that these Waters enable Nature, by accelerating the Circulation of the Blood, and exciting a Fever, to dislodge the offending Matter in those Parts of the Body, the Vessels whereof are too small to admit the Particles of Shop-Compositions ; and in which Obstructions could not be removed, without the Assistance

Assistance of a Fever; agreeable to the Observation before recited, that Medicines can do nothing without the Assistance of Nature, though Nature will often cure, when Medicines can prove of none Effect.

CHAP-

CHAPTER THE TWELFTH.

*Of the Heat peculiar to Bath Water ;
and of the wonderful Alterations
excited by Heat, in the Power of
Solvents, or Menstruums.*

BY the Observations contained in the foregoing Chapter, we may naturally be led to conclude, that the solvent Power of Water will always increase, in Proportion to it's Heat, even to the Degree of boiling: But to demonstrate clearly that it is by no Means safe in the Science of Physick to amuse our Minds with plausible Appearances, or to extend our Consequences beyond Experiment; numerous Proofs may be recited, which will convince us, that
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in many Cases the dissolving Power of Water decreases, as it's Degrees of Heat increase; for Instance, Balls formed with Flower, mixed with Water, will dissolve in cold or warm Water, but harden in boiling Water; and every one knows, that the White of an Egg will likewise mix intimately in the Water either cold or warm, but hardens, and becomes indissolvable in boiling Water.

This hardening, it is observable, begins with a certain Degree of Heat, and, till it arrives at that, the Subject is more and more diluted, in Proportion as the Heat increases.

And the same Alterations are produced by Heat on the Serum of the Blood, as are in the White of an Egg.

Hence

Hence proceed the fatal Events of burning Fevers, in which the most fluid Parts of the Blood are coagulated, made stagnant, and rendered unfit for Motion, by the preternatural Heat attending them.

Again, the Urine, as it's Heat decreases, frequently deposits a gross Sediment, which Sediment the Urine will again take up, by being restored to it's natural Warmth. These two Observations demonstrably prove, that by the particular Degree of Heat which attends a Body in Health, it is, that the whole Mass of Humours, which circulate through every Part of the Animal, is kept fluid, and capable of Circulation.

And, therefore, as most of our chronical Disorders are produced by Obstructions in some of the principal

pal Parts of the Body, the Removal of which Obstructions depends on a Restitution of Fluidity to the obstructing Matter; it is evident, that this is obtainable from the Use only of some proper Solvent; and that the Power of such Solvent is variable, according to the particular Degree of Heat with which it is employed.

Whence it must follow, that the Choice of the Baths in *Bath* is a Matter of the utmost Consequence to the Sick, since each of them is attended with a different Degree of Heat different from either of the other; and since it is certain, that the Constitutions of different Persons, and even of the same Individual, at different Times, will be differently affected with the same Degree of Heat; so that the *Hot* Bath may be very dan-

dangerous and prejudicial, when the *Cross-Bath* would be extremely beneficial ; and *vice versa*.

To convince my Readers of this Truth, in the most familiar Manner, I need only observe, that some People will be equally heated with a Glass or two of Wine, as others would with a Glass or two of Brandy ; and even the same People, will at some Times, be intoxicated with a small Quantity of either of those Liquors, who at other Times would be quite insensible of any Effect from a much larger Quantity.

Whence we may reasonably conclude, that the Removal of those various Obstructions, and the Diseases which they produce, and which we see are generally vanquished at the Bath, may not only depend on a
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free Exhibition of an aqueous Fluid, impregnated as these Waters are, with a certain Quantity of particular saline Substances, but likewise on their being accompanied with that Degree of Heat which is natural to either one or other of the Fountains at *Bath*; and, therefore, that it is impossible any artificial Water, though constituted with exactly the same Ingredients as the *Bath* Waters, should produce the same Effects, unless at the same Time they be charged with the exact Degree of Heat which those Waters naturally possess.

From these Remarks it is certain, the Heat, attendant on these Waters, must be a Matter that merits the deliberate Consideration of every Practitioner, as the same is unquestionably of the greatest Consequence. But

at the same Time it must be granted, that, till Experiment and Observation shall have convinced us how much the Efficacy of the Waters depends upon their particular Degree of Heat, nothing certain or conclusive can be said about it, more than what may be drawn from the preceding general Observations, on the Alterations we see the Power of Solvents are liable to, by the Assistance of greater or less Heat.

CHAPTER THE THIRTEENTH.

*Of Fevers arising from Bath Waters;
and of their Utility in the Cure of
chronical Disorders.*

MANY are the Diseases that afflict Mankind, in which it would be dangerous to attempt a Cure by active or ponderous Medicines, and not only the Honour of the Physician, but the Welfare of the Patient, would be more likely to be promoted by a total Prohibition of all Medicines, than by ordering any such Remedies, unseasonably. This must generally be the Case, either when Obstructions are become scirrhus, or otherwise indissoluble, when stagnant Humours have acquired a Tendency to any

corrosive or putrid Acrimony, or the Solids become so diseased as to be unable to bear with that Distention which they must of Necessity undergo by the impelling Force of the circulating Blood.

For, whenever the Fluids or Solids of the Body are in such a State, no active Medicine can with Safety be administered; and Physicians must be inexcusable in such Cases to attempt a Cure, as thereby they must inevitably hasten the Dissolution of the Patient. Wherefore, as the natural Effects of *Bath Waters* are to invigorate the *Vis Vitæ*, and accelerate the Circulation of the Blood, they must of consequence be in every Distemper a Medicine either beneficial, or dangerous. For feverish Commotions in the Blood, whether they are the Effect of Art or Nature, will

will prove salutary or fatal in every Constitution, according to the Fitness of the Humours to be moved, and the State of the Solids to bear with Distention.

The justly celebrated *Sydenham*, who, from the Accuracy of his Observations, is deservedly called the *British Hippocrates*, and the great *Boerhaave*, tell us, that a Fever is no more than an Effort of Nature, to expel something from the Body that is injurious to the Constitution, and that it terminates either in Health, another Disease, or Death; whence it must follow, that as often as any Fever arises in any Individual, whether he is otherwise diseased or not, the Physician should carefully observe the Motions of Nature, and second her friendly Endeavours to discharge from

the Blood the Causes of Disorders; unless, as was before observed, the Humours are such as ought not to be moved, or the Solids unable to bear with their Motion. Indeed daily Observation has demonstrated, that we are liable to various Disorders that cannot possibly be cured without the Assistance of a Fever, which is always accompanied with a quicker Pulse, and a greater Heat of the Body, than is natural to a State of Health; by means whereof Obstructions in the larger Vessels are broke down, and such a Motion is excited in the Humours contained in the smaller Vessels, into which the Particles of ordinary Medicines may not obtain Admission, as dissolves Juices stagnant therein, and renders them again fit to be carried thro' every Canal of the animal

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Machine, in the common Course of Circulation.

How often does it appear, even to People not versed in the healing Art, that Distempers, which have been of a long Continuance, and for the Cure of which the common Aids from the Shops have been ineffectually tried; have, in a few Days time only, been perfectly cured by means of an accidental Fever?

Indeed, every Gentleman of the Faculty, who is conversant in the practical Part of his Profession, cannot but know, that in Diseases, which arise from Compression, or other Obstructions of the Nerves, or any principal Organs of the Body, such as Palsies, and the like; there is much greater Hope of a Cure, while the Fever continues, than when the Circulation grows

more languid ; for, by the Vigour of the Fever alone, the offending Matter can best be attenuated and expelled.

With due Deference, therefore, to such as are of Opinion, that *Bath Waters* are hurtful in all paralytic Complaints, I must beg Leave to dissent, and to observe, that as often as the Body, or any Part of it, becomes paralytic, by any Viscidity, or other dissolveable obstructing Matter, pressing upon the Nerves in general, or the Nerve of any particular Part, or their Origins, in which Cases rather a Numbness than a Shaking attends ; these Waters, if they be used so as to excite a Fever, will always do Good : Tho', when the Palsy is brought on by Obstructions in the Brain, a preternatural Influx of Humours to the Head, indissoluble Congestions of
any

any Kind, and many other such like Causes; these Waters, and all warm Baths, must prove insignificant, if not prejudicial. To think, therefore, that *Bath* Waters are injurious *in all* paralytic Disorders, is an Opinion no better founded, than it is to esteem the Waters of *Bath* the *only* effectual Remedy for their Removal. Nay, not only the Solution of obstructing Matter in the Tubes of animal Bodies, but the Separation of morbid Humours from the Blood, is seldom or never performed without some Degree of Fever; or, in other Words, without Nature's own Efforts (whose proper Work it is) to expel whatever is noxious in every Disease: This is manifest, from the Fever which attends the Beginning of the Measles, Small-pox, and other erup-

eruptive Disorders; for the Expulsion of which, the Endeavours of Art would, in many Instances, prove quite ineffectual: For it is unquestionably true, that tho' Nature can perform Wonders without the Assistance of Medicine; yet Medicines can do nothing, unless assisted with the Powers of Life; which has given Rise to an old Maxim in Physick, "Nature is the Physician, and Medicine her Mate."

When, therefore, *Bath* Waters quicken the Pulse, and excite a preternatural Heat, with other Symptoms of a Fever; can any one, who considers these Truths, be alarmed at the Event? Or be so absurd, as the Practice at *Bath* has been, as to counteract Nature and the salutary Effects of the Water on the Body, by im-

immediately ordering Patients to desist from their Use, or prescribing nitrous and other cooling Draughts, with Phlebotomy, and the like? Surely, no one, whose Practice is founded on any rational Principles, can be guilty of such flagrant Misconduct; when it is the Duty of the Physician, in the Cure of Diseases, to watch the Motions of Nature, and to endeavour rather to assist than direct her therein; As it is certain, that the smallest Evacuation, which she critically makes, will free a Constitution from the Cause of Distempers, more than the largest procured by the Assistance of Art.

We often see, that a moderate Quantity of Blood, spontaneously discharged from the Nose, or from the hæmorrhoidal Vessels, in Phrenies and Fevers, instantly abates the
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Disease, after copious Bleedings by the Lancet have been quite ineffectual.

Surely, therefore, it was a wise Rule in the judicious and successful *Sydenham*, above all things, to be cautious not to do Hurt, by the Exhibition of Medicines, in Cases wherein he had not learned by Experience how to do Good ; and in every Disorder, wherein Nature had not pointed out the Paths in which the Physician should tread, to be careful lest he should be misled by the *flighty* Dictates of Theory, so as to interrupt Nature in her wise Conduct, by putting her on Methods to expel the Enemy, contrary to what she designed ; and rather with Patience to wait her Motions, to observe what the *Vis Vitæ* is aiming to perform ;
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and, when that is discovered, then, by the most rational and experienced Means, to promote the same. This is the *Hippocratic* Method of Practice, and the Method always to be pursued by the conscientious and skilful Physician.

CHAP-

CHAPTER THE FOURTEENTH.

Of the external Use of Bath Waters.

TO give my Readers an Account of the Virtues of the different Baths that are known, is by no means my present Intention; for the Waters of *Bath* are the designed Subject of these Sheets, and therefore what follows is to be understood only as relative to their Nature and Effects, when they are in different manners applied externally.

The learned Dr. *Oliver*, and the rest of the Faculty who have favoured the World with their Sentiments on the external Use of these Waters, have accounted for all their Virtues
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and Qualities, from the Effects which are constantly observed to be produced by a simple Water, heated to the same Degree of Warmth, without ever observing or explaining to us what Alterations there must be in their Qualities, by having therein dissolved the several saline and other Substances naturally contained in the hot Springs at *Bath*; and notwithstanding they all know, that the Waters of *Bath* are not a simple, but a natural medicated Water, and acknowledge that it's saline Principles must make it more effectual, than any Waters could possibly be, in which these Ingredients are not to be found; yet they never tell us in what particular Respects they are altered in their Virtues by such an Impregnation, as if the same be so universally

versally known, as to render all Explanations of that Sort unnecessary. But, agreeable to the first Plan of this Undertaking, it will be requisite for understanding this Subject as we ought, to shew, First, what are the Effects of a simple warm Bath, prepared with nothing but a pure soft elementary Water. Secondly, how the Qualities thereof must be changed by the Admixture of the several Ingredients contained in *Bath Waters*; and, Thirdly, how these Waters, externally applied in different Manners, must produce different Effects, and be of Service in different Disorders.

The ingenious Dr. *Stephenson**, with exact Discernment, speaking of warm Baths, tells us the Use of warm Bathing seems to be so little under-

* Vide Med. Essays, Vol. V.

stood, that it is often preposterously used and injudiciously abstained from; and therefore he wishes the Principles, on which it is practised, were cleared up, and established on a solid Foundation.

That pure warm Water, externally applied, will not only dissolve and wash away all recrementitious Juices soluble in aqueous Liquors, which may be stagnant in the Meshes of the Skin, but will likewise instantly relax the Fibres and open the excretory Ducts of the minute Vessels, is demonstrable by innumerable Experiments; and, of this Relaxation, it must be a natural Consequence, that the Fibres which constitute the Vessels of the Body, and the Vessels which they constitute, must be preternaturally disposed to Dilatation,

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from the expansive Force of their contained Fluids, when that Force is increased by the Addition of Heat, or any other Cause capable of accelerating the Motion, or adding to the Impetus of their Circulation. As often, therefore, as the Body is immersed in Water warmer than the Blood, all the Humours of the Body must be expanded, the Cavities of the Heart and Blood-vessels dilated, the Pulse raised, the Circulation invigorated, and the Humours, with more Freedom and Ease, carried to the Extremities of the Vessels, to perform their several Secretions and Excretions, much in the same Manner as we see the Mercury or Spirit, in the Tube of the Thermometer, are rarified by the Application of any Body warmer than the Atmosphere ; and,

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in consequence thereof, take up a larger Space in the Tube. But when the Body is immerfed in a compound, inftead of a fimple warm Water, the immediate and consequential Effects muft, and will, vary in many Refpects, according to the Qualities of the different Ingredients with which the Water is impregnated ; for it muft thereby be rendered more emollient or relaxing, or more tonic or aftringent, than fimple Water.

Nay, indeed, Waters may be induced, by the Addition of certain Subftances, with many other Virtues and Powers, which fimple warm Water can never produce. All Waters, thus medicated, will have the Powers and Effects, when ufed as Baths, which the fimple Waters, in consequence of their Warmth alone,

may be judged to produce : But how far we may expect to have the Fibres of the Skin relaxed, and it's Pores opened, by bathing in the Baths at *Bath*, as effectually as we may procure these Changes, by bathing in simple Water ; every one may judge, after considering what has before been observed, that the Waters of *Bath* contain a chalybeat Principle, and a considerable Portion of a calcarious Earth, both dissolved in a subtil Acid ; that they curdle Milk, and will not unite with Soap ; from whence it is impossible they should not brace, instead of relaxing the Fibres, and close, rather than open the excretory Ducts of the Skin ; and, therefore, all those Effects, especially an Increase of sensible Perspiration, which have been produced by bathing in the Waters at *Bath*, and

have

have hitherto been attributed to their relaxing Power solely, must be ascribed to some other of their inherent Qualities.

It is most certain, that whatever are the Effects of a partial Bath on the Humours of the Part that is bathed, the same must in a higher Degree be the Effects of an universal one; let us therefore, in this Place, recite the Experiment made by the beforenamed Dr. *Stephenson*, to explain the Nature of the Pediluvium, as the same cannot but be universally convincing, that all the Effects of a warm Bath, except on the Surface of the Body, are the Consequence of a Rarification of the Humours alone. His Words are *:

“ In a cool Evening, *October* 2, before Supper, I caused two Youths, the

* Edin. Essays, Vol. V. p. 871.

one of the Age of 14 Years, the other 13, both ignorant of the Purpose of the Experiment, to put their Legs in warm Water, after examining the Colours of their Skin, and the Size of their Veins in their Hands and Faces; and, while they continued in the Pediluvium, I counted their Pulse by a Watch measuring Seconds, and observed,”

“ That at eight o’Clock, immediately after the Immersion to the gartering below the Knee, in Milk-warm Water, their Pulses beat in a Minute, the First 66, the Second 84, as before Immersion. At 15 Minutes after 8, the Water a small time before being increased in Heat, tho’ not to the Degree of the Warmth of Blood, the Second yawned and began to breathe quicker, their Pulses
then

then beat, the First 69, the Second 88. About 25 Minutes after 8, the Water being made full blood-warm, the Veins of their Hands were greatly swelled, the Second had his Face flushed, their Pulses beat, the First 75, the Second 94. At 35 Minutes after 8, both of them had the Veins of their Faces and Hands very much distended; the First said he was greatly disposed to Musing, the Second was sleepy with his Face so red, that I was afraid of hurting him, by pursuing the Experiment any further. Both their Pulses, which in the Beginning were soft and small, became full and hard, and beat, the First 80, and the Second 98 in a Minute. Then I made them set their Feet on a spread Carpet, sitting still without any Motion, as they had

done before, and reckoned their Pulses, which, at 40 Minutes after 8, beat the First 71, the Second 90. At 46 Minutes after 8, their Pulses became less, and softer, beating, the First 69, the Second 88. A little after 9, the Flush was off the Second's Face, and their Pulses were become quite soft and smaller, the First 66, the Second 85, almost as they set out."

"This," says the ingenious Author, "I take to be an *Experimentum Crucis* in the Matter, giving a true Explication of the Manner whereby hot bathing operates; and demonstrating, that the Distention of the Vessels is chiefly owing to the Rarification of the contained Fluids."

"My Opinion" (says he) "of the warm Pediluvia is this: The Legs becoming

coming warmer than before, the Blood in them is warmed; this Blood rarifying, distends the Vessels; and not stagnating, but circulating, it imparts a greater Degree of Warmth to the rest of the Mass; and as there is a Portion of it constantly passing thro' the Legs, and acquiring new Heat, it is, in the Course of Circulation, communicated to the rest of the Blood; the whole Mass rarifying, occupies a larger Space, and of consequence circulates with greater Force. The Volume of the whole Blood being thus increased, every Vessel is distended, and every Part of the Body feels the Effects of it, the distant Parts a little later than the first heated ones. In the above Experiment, not only the immersed Parts and lower Extremities swelled, but the whole
 Body,

Body, and the Pulses of the Wrists and Temples, beat fuller and quicker, as well as those derived from the descending Aorta.”

“ Hence it is most evident, that Diseases, which are cured by warm Bathing, or the Pediluvium, are cured by a greater Force of Circulation, than is natural, through the Parts afflicted; carrying off, by that Means, what was stagnating or moving too sluggishly in them. Where, therefore, Obstructions are not of long standing, and where the impacted Matter is not obstinate, warm Bathing may be of great Use to resolve them quickly; for thereby the Use of deobstruent Medicines, which operate by increasing the Momentum of the Blood, will be rendered not only less liable to rupture the Vessels, but
like-

likewise more efficacious in attenuating stagnant Juices, in whatever Part they may happen to be formed."

" In recent Colds, with slight humoral Peripneumonies, warm bathing in simple Water is frequently an immediate Cure ; for, by increasing the Force of Circulation, and opening the Pores of the Skin, it drives freely through the Lungs that Matter which stagnated or moved slowly in them, which is a common Cause of Inflammations and their Consequences."

" Thus we see, that warm Baths may and do prove conducive to the Resolution of Obstructions, by exciting short and safe Fevers; and that to direct them properly is to imitate Nature, which, by a Fever, often carries off the Cause of chronic Ailments."

The

The Experiments of this ingenious Gentleman are most clear and convincing, and his Inferences most just and conclusive. When partial Bathing is found thus powerfully to effect the Fluids and Solids universally, it is not to be doubted, that the immediate Parts bathed, suffered the first and greatest Change. Hence we may easily judge, that every Effect of a long continued Pediluvium, must necessarily attend universal Bathing, in a much higher Degree. But, in applying this to our present Purpose, we must ever remember the Difference between a simple and a medicated Bath; and that those of *Bath*, in particular, are found injurious in most pulmonic Cases.

Now, without mentioning at present the Virtues of the several Substances

stances contained in the *Bath Waters*; the Heat of them alone, when used as a Bath, must produce great Alterations in the Blood; for thereby it is, that the intestine Motion of the constituent Parts of the Blood are considerably increased, it's Viscidities broken and resolved, Obstructions in general from that Cause removed, and the Secretions and Excretions properly promoted.

Whence, the great Advantage with which the different Baths at *Bath* may be used; by different Patients, in the same Disorders, must evidently appear; as the Cure of each Individual must certainly depend on the particular Degree of Heat in the Bath, being properly suited to the Strength of the Solids, and the State of the Humours in the Person to be bathed;
since

since no one can doubt, but a greater
 or less Heat will be requisite, in dif-
 ferent Constitutions, to attenuate the
 Juices, by a Rarification of the Blood
 to a certain Degree. But as these
 salutary and good Ends are the na-
 tural Effects of warm Baths, when
 they are judiciously used, we may
 reasonably expect contrary Effects
 from their Misapplication: Where-
 fore Practicioners, who have consi-
 dered their Nature and Powers, very
 justly caution those who may have oc-
 casion for them, against a rash and in-
 discriminate Use of them; and have
 clearly demonstrated, that wherever
 there is an irresolvable Obstruction, a
 warm Bath can never afford the least
 Benefit; but will, on the contrary, do
 Mischief, by pushing against Matter
 that will not yield to the impelling
 Force,

Force, with a stronger Impetus of Circulation, than the stretched and distended Vessels can bear: For which Reason, they forbid their Use to all phlethoric, gross, or full Habits of Body, before due Evacuation, lest the Rarification of the redundant Juices, by Heat, should prove dangerous and destructive, till the Fullness be by proper Means abated, and sufficient Room obtained in the Vessels for a freer Circulation.

They likewise prohibit their Use, to all whose Stomachs or Intestines are charged with Food or Excrement, lest Crudities might be impelled from the first into the second Passages, and thereby Obstructions and Inflammations produced. And, indeed, all such who have weak or long obstructed Viscera, especially if
there

there appear the least Reason to suspect the same to be scirrhus, are very wisely forbid the warm or hot Baths; lest, by means thereof, the Humours may be either invited, or propelled to the debilitated Bowels. And, for the same Reason, every Person who enters into these sort of Baths, ought to be strongly cautioned never to dip their Heads into the warm Water; but rather, in some particular Cases, to keep upon them Cloths moistened in cold Water, while they continue in the Bath, lest by over-heating, distending, or replenishing the Vessels of the Brain, which are thinner than those of other Parts, and unassisted with muscular Pressure, the same should be ruptured, and fatal Consequences ensue. An Instance of
which

which the ingenious Dr. *Stephenson*, in the before mentioned Essay, has given to the Publick. How justly, therefore, has Dr. *Lucas* observed, that

“ There is nothing of greater Im-
 “ portance to the Patient, for whom
 “ warm Bathing is found proper,
 “ nor in which the Honour of the
 “ Prescriber of this Bathing is more
 “ concerned, than the ascertaining
 “ the fit Times and Seasons, the
 “ regulating and preparing the State
 “ and Temperament of the Body
 “ for bathing, the determining the
 “ kind of Bath, and it's Tempera-
 “ ture, precisely, together with the
 “ Space of Time necessary for tarry-
 “ ing in the Bath, with due Accura-
 “ cy; without the strictest Observance

Q

“ of

“ of these Cautions, Mischiefs infinite
 “ must ensue.” He goes on, and says,
 “ Thus, we find unfit Subjects, or the
 “ best prepared, upon going into ill-
 “ regulated Baths, or tarrying too
 “ long in them, attacked with Head-
 “ aches, even to a Phrensy ; with
 “ Anxiety and Palpitation of the
 “ Heart, with Faintings and Swoon-
 “ ings, &c. These Complaints, or
 “ some of them, are always likely to
 “ attend soft, delicate Constitutions,
 “ with relaxed Fibres ; especially, if
 “ the Bath be too hot. Such as are
 “ sanguine and gross, with the In-
 “ testines and other Bowels full, must
 “ be liable to Obstructions, Inflamma-
 “ tions, Fevers, continual or intermit-
 “ tent, with Variety of other Disor-
 “ ders, depending upon the parti-
 “ cular

“ cular Circumstances of the Health,
 “ and Habit of the Body, upon the
 “ Seasons of the Year, and the Na-
 “ ture and Temperature of the Wa-
 “ ter. The more compound the
 “ Water is, especially with astringent,
 “ styptic, or absorbent Matters,
 “ such as Alum, Vitriols, or Earth,
 “ which constringe, constipate, or
 “ stop the Pores, the more subject
 “ will the Patient be to Fevers: An
 “ Observation which should make
 “ Men most cautious in the Use of
 “ Baths, whose Waters are loaded
 “ with any of these mineral Matters,
 “ as the *Caroline Baths in Hungary*,
 “ ours in *Somersetshire*, those of *Bor-*
 “ *set near Aken*, and the like.”

Indeed, the Remarks of this learned Gentleman on the Chemistry of Wa-

ters, and the Nature of Hot and Cold Baths, are throughout so accurate and just, that there is no one, whose Light of Reason is not excluded by Prejudice, but must confess his Book on those Subjects to be a Performance abounding with real Knowledge, instructive and useful: And therefore, without extracting any more Observations from the same, I shall refer the Reader to the Perusal of his Book; and dare assure him, that the reading of it will afford him Profit and Pleasure, deserving of the Time and Trouble, necessary to be employed therein.

But the Author is here speaking only of simple warm Bathing; from which these are ever to be accurately distinguished: The Baths at *Bath* are composed of a compound, mineral

ral Water, and are therefore to be considered as medicated Lotions, whose Effects on the Solids and Fluids in general, as well as on the Pores of the Skin in particular, must be remarkably different. But, of the particular Powers with which these or any other medicated Baths are indued, Experience alone can convince us: By this, we know, the smallest Proportions of Metals, dissolved in Acids, tho' ever so greatly diluted in Water, will produce unexpected and astonishing Effects. Among these, Mercury, Copper, Lead, and Iron, are very remarkable; and therefore, as the last of these is contained in *Bath Waters*, and that not alone, but united with a particular neutral Salt, combined with marine Salt; we may reasonably

believe these Waters become effectual in freeing the Skin, as we find they do, from leprous Defecations; since Experience has shewn us, that a Solution of Sal Ammoniac in pure Water, is often sufficiently powerful to remove very troublesome and hard Warts; and that a few Grains of sublimate Mercury, or Verdigrise, in a large Quantity of Water, will alone correct the Intemperature of inveterate Ulcers, where our Reason would not induce us in the least to expect it. And, in all Probability, when, by means of the Salts, or other Principles contained in these Waters, those Diseases are removed; were the Use of the Baths to be continued, from their natural Impregnation, they might so establish the

Tone

Tone of the Solids, as to prevent a Relapse.

With what Propriety, then, Baths of these natural, medicated Waters can be esteemed of similar Efficacy to Baths made with pure simple Water; let those who consider these Matters, judge for themselves.

The learned *Boerhaave*, as well as many other ingenious and distinguished Writers in Physick, have, in several Disorders, recommended Frictions with Flannels, charged with Vapours from oily, aromatic Vegetables, Gummi-refins, and Sulphurs; and likewise the Vapours of Water, impregnated with such like Substances: And Instances of their good Effects are not wanting to justify the Practice. This makes it surprizing

to see, that the natural Exhalations of *Bath* Waters should continually impregnate the Air at *Bath*, and the Physicians of that City should so long totally neglect to direct their Use in the Cure of any Complaints; tho' they may be much better adapted to many, than are either Lotions, or Immerfions in the Water; the Water that ascends in the Form of a Vapour, and the Particles it conveys along with it, being more subtil and penetrating, than when they are entangled with it's heavier Parts in the aggregate State.

But, as this Method of Practice has not as yet received the Sanction and Countenance of Fashion; left the Enmity, that has been raised against others for an Attempt of this
Sort

Sort should pursue me likewise; I shall, for the present, satisfy myself with what I have already said on this Method of using the Waters, and close this Chapter on the external Use of them, with observing, that in many Cases, wherein long-obstructed Bowels, or any other particular Symptoms, may contraindicate Immersion in the Waters, and any local fixed Pain, Contraction, or other Disorder in the Limbs, require their external Application; the Method in Practice, of directing the same to the diseased Part with an impulsive Force, by means of a Pump, may with great Safety and Advantage be tried; unless the Obstructions in the Part to be pumped upon be irremovable, and the Matter, whereof they are formed,
be-

become putrid, and unfit to be taken again into the Course of Circulation; in which case, Pumping or Bathing will be always found to be prejudicial, and sometimes productive of fatal Consequences.

CHAP-

CHAPTER THE FIFTEENTH.

*Inferences from the Preceding; and
the Conclusion.*

THE Observations contained in the preceding Chapters, which have Experiments, Truth, and Reason, for their Basis, among many other interesting Inferences, point out the following Maxims.

I.

When our Reasonings upon the Effects of Medicines, as well as upon any other Matter, are founded upon false Principles, our Reasonings must be vain, and our Inferences groundless and delusive.

The

II.

The Multiplying of Medicines is the Child of Ignorance, and the Cause of much Delusion; for when Variety of Medicines are exhibited together, the Effect must be uncertain, and it will be impossible to ascertain to which Part of them, the good or bad Success is to be ascribed.

III.

The drawing Inferences from mistaken Data, or Precedents from Practice immethodical and vague, are as dangerous as entering upon Practice, void of just Theory and necessary Experience.

When

IV.

When we want to discover the Nature and Virtues of an unexperienced Remedy, chemical Experiments and Reasonings upon them, are the surest Helps to that Knowledge.

V.

Remedies in Diseases are mechanical Instruments, the Powers of which depend on the Solidity, Bulk, and Figure of their Particles; and, to use them with Skill, requires a Knowledge of what they can, and what they cannot do.

VI.

Where the Quantity of an Ingredient in a Composition is very minute,
we

we cannot from thence with Safety conclude, that it is ineffectual.

VII.

Such a Knowledge of any Medicine, as is sufficient to discover what will destroy it's Powers, may likewise demonstrate by what Means they may be augmented.

VIII.

Practice without Theory is a dangerous Guide, and Theory without Practice is intirely usefess.

IX.

Mankind are more led by the Appearances of Things, than by Convictions arising from close Examinations.

If

X.

If Medicines injudiciously used do any Good, much more might be expected from them, by a skilful Application.

XI.

The Credit of every Medicine depends as much on the Skill of it's Director, as on the Virtues of the Remedy.

XII.

Simple Medicines, by being united together, sometimes lose the Virtues they had in a separate State, and often acquire new Powers, which they had not before their Union.

Sim-

XIII.

Simples, which will cure in a separate State, without being compounded, should not be interrupted in their Operation by Mixture with other Medicines.

XIV.

The Effects of a compound Medicine depend upon the perfect Union of it's Ingredients; and it's Effects must be altered by every Thing that is able to decompound it.

XV.

Medicines capable of Action only in a State of Solution, lose their Powers by a Destruction of their Solvents.

Ap-

XVI.

Approved Compositions seldom admit of being altered in the Proportions of their Ingredients, or by the Admixture of other Articles; for thereby they may be inconceivably altered in their Virtues and Effects.

XVII.

When compound Medicines disagree, it is better to alter the Proportions of their Ingredients, than to complicate them by the Addition of other Articles, or give them without any Correction in insignificant Doses.

XVIII.

If compound Medicines produce Effects, not assignable to any of their
R known

known Ingredients, it is probable they contain some undiscovered Articles ; but while their Effects are to be accounted for, from the Qualities of their known Ingredients, and those resulting from their Combination ; we may reason with Safety thereon ; for we have no Right to imagine they contain any other Principle, till from Experience we have some Reason to think so.

XIX.

The Virtues of Medicines as greatly depend on their particular Doses, as they do on their peculiar Solidity, Gravity, Figure, and other Qualities.

XX.

The same Remedies which are only preparative, in one Disease, may
I become

become curative in another ; and so on the contrary.

XXI.

The Skill of the Physician will always be defeated, if the Apothecary be unskilful or unjust in preparing his Medicines. The Physician should, therefore, be acquainted with Pharmacy in all its Parts, and look to the Preparation of the Medicines he has occasion to prescribe.

XXII.

The Science of Physick consists of divers parts, which are either judicial or ministerial, of the latter Pharmacy is one. The Physician must be Master of all the Branches. He must be an Apothecary. But the Apothecary may excel in his Sphere without being a Physician. These are the true Dis-

tinctions to be made between Professions too frequently misunderstood, or confounded in these Kingdoms.

XXIII.

Bath Waters are a Medicine, consisting of many Ingredients exquisitely united together in certain Proportions, by the inimitable Chemistry of Nature.

XXIV.

The Ingredients of the *Bath Waters* are not similar to each other in their Qualities, but each of them has Properties and Virtues peculiar to itself.

XXV.

As the Qualities of these Ingredients are each of them different; by the Variation of their Pro-

Proportions ; the Nature and Powers of the Compound will be altered.

XXVI.

Some of their constituent Parts are volatile, and others are fixed.

XXVII.

The Objections to the Use of the Waters, from the Qualities of their volatile Parts, are all of them removed when the Waters are cold.

XXVIII.

The Waters when cold, and distant from *Bath*, will be effectual in Diseases, wherein they would be

R 3

very

very prejudicial if drank at the Spring ; and drank at the Spring, they will cure Diseases, in which at a Distance they would be quite ineffectual.

XXIX.

All the Virtues of the Salts continue in the Waters, when they are distant from *Bath*, and the Salts are an excellent Assistant to the Waters, and separately productive of many good Effects.

XXX.

Other Salts may appear to be exactly the same, yet their Virtues on Trial may be widely different.

When

XXXI.

When the Waters disagree in their natural State, it is better to correct them by Preparations from the Waters, than by any other Assistant.

XXXII.

Salts differ in Effects according to the Qualities of the particular Earth or Acid in their Composition, and according to the Manner of their Union.

XXXIII.

Salts are the most powerful of Medicines, the most remarkable Solvents, and their Natures and Qualities are to be known only by Experiment.

XXXIV.

The chief Virtues of medicinal Springs are, in a great measure, owing to the Water itself, independent of their solid Ingredients; and pure elementary Water is an almost universal Medicine.

XXXV.

The Anatomy of the human Frame, the animal Oeconomy, and the Nature of Bodies in Health, must be known, before the Nature and Cure of Diseases can be conceived or performed.

XXXVI.

Many acute and most chronical Disorders arise from different kinds and degrees of Obstructions; and
their

their Cure depends upon recovering the Tone of the Solids and the natural Consistency of the different Humours in the animal Body, by proper Diluents, Solvents, &c.

XXXVII.

On the Solution of stagnant Juices in the Body, the Cure of Distempers greatly depends, and the Power of Solvents can only be known by Experiments and Observations.

XXXVIII.

The Powers of Solvents are limited to certain Substances, and are greatly varied in their Effects, by Heat and Cold.

Due

XXXIX.

Due regard to the Difference of Heat in particular Baths is of great Consequence to the Patient and Prescriber : Baths of different Heats are not therefore to be used indiscriminately, nor without great Caution.

XL.

Fevers are the Efforts of Nature to cure Diseases, and *Bath Waters* often cure by exciting Fevers ; therefore the Care and Conduct of the Physician must be of the utmost Consequence, when *Bath Waters* produce Fevers.

XLI.

Many Diseases are incurable ; and, in all such, Medicines should be avoided, especially such as are known to be violent or too active.

Bathing

XLII.

Bathing is not always safe ; but it is often found to be useful, in Cases wherein it is generally forbid.

XLIII.

Pumping may be used, where Bathing is improper ; and Bathing may cure, where Pumping is useless.

XLIV.

All compound Liquors to be used as Baths, should be considered as medicated Lotions ; for they have different Qualities, according to the different Ingredients with which they are charged, and they produce Effects on the Parts with which they come into Contact, according to the Qualities

Qualities of the Ingredients with which they are impregnated.

XLV.

During the Use of warm Baths, the Head should be guarded from an Influx of Humours; and the Neglect of this may be extremely dangerous.

XLVI.

No one should bathe, without due Preparation; and the Time, and the Season for using the Bath, as well as it's particular Temperature, should be carefully considered.

XLVII.

From a Number of historical Accounts, of the Effects of *Bath Waters*, left to themselves, uninterrupted,

rupted, unaltered, by any sort of Medicines, and from such alone, the Virtues of the Waters can best be ascertained, and Practitioners directed in what Time, Proportion, and Manner, they are to be prescribed, in different Disorders, to the greatest Advantage.

As the Waters, therefore, of *Bath* are a Medicine, prepared and delivered to us by the Hand of the Omnipotent ; it is the Duty of all who are benefitted by them, in Gratitude to their bountiful CREATOR, and in Charity to their Fellow - Creatures, to make known to the World the Good they have received from these healing Fountains ; that their Brethren, who in like manner are visited with Sickness, may share in the Blessing, *take up their Beds and walk,*

walk ; while with Thankfulness un-
feigned, and Voices raised, all join
in the Praises of the great AUTHOR
of their HEALTH, and with inrap-
tured Seraphs sing,

GLORY BE TO GOD ON HIGH !

ON EARTH PEACE !

GOOD-WILL TOWARDS MEN !

T H E E N D.

